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ARCHITECTVRE

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DECORATION

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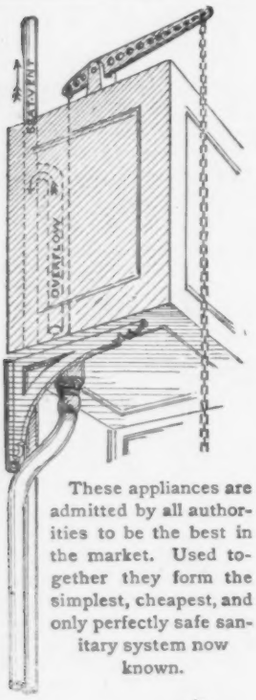

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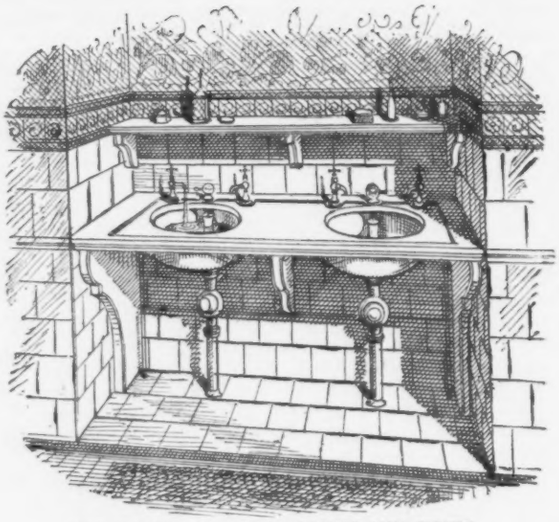

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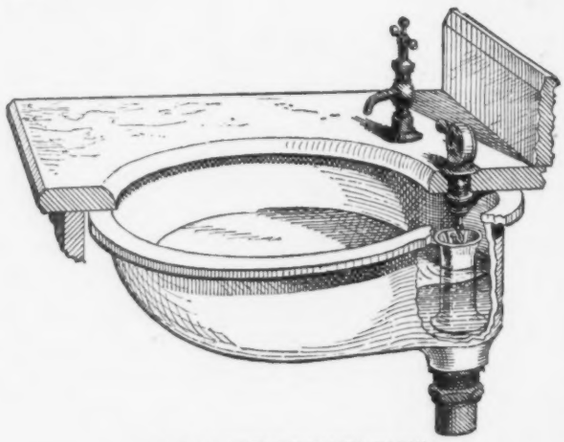

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# THE AMERICAN ARCHITECT AND BUILDING NEWS.

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A DREADFUL accident took place this week near Boston, on a branch of the Boston and Providence Railroad, where six crowded passenger-cars, out of a train of nine, broke through a bridge over a highway, and fell about twenty-five feet, one above another, crushing the woodwork into splinters, and killing nearly forty people, besides injuring about one hundred more. The bridge was of iron, about one hundred and twenty-five feet in span, supported by two trusses. According to the newspaper accounts, the trusses were originally of wood, but about thirty years ago one of the wooden ones was removed, and an iron one set in its place. Twenty years later the other wooden truss was also replaced by an iron one, but of a different design from the iron one previously used, so that the bridge rested on two iron trusses of the same span, but of different design and construction, and differing about twenty years in age. The roadway was designed for a double track, but only one track had been laid over it, and this was placed at the side, so as to allow room for the second track beside it. The cause of the accident is as yet unknown. A serious flaw was found in one of the broken members of the truss, near the abutment, but there are indications that the first fracture occurred near the middle of the span; and a thorough analysis of the design of each truss will probably be necessary, to give the clue for finding the weak or corroded member whose failure brought about the destruction of the bridge. Of course, innumerable theories are offered, to explain the disaster, by those ingenious individuals who furnish science to newspaper representatives. One of these persons, who was discovered in the offices of the railway company, is reported to have said that the bridge was an excellent one, in good condition, and regularly inspected, and he could only account for its destruction by supposing that a truck or some other portion of a car had given way just before the train reached the crossing, and the broken piece, hanging below the car, had caught in the bridge and knocked it endwise off the abutment. This novel idea is particularly to be commended to engineers, who will henceforth, we trust, see to it that their railway bridges are anchored to the neighboring trees, or some other convenient objects, so that they may not be in danger of sticking to the car-wheels and getting carried off. Another expert in metallurgy accounted for the trouble in a different way. He had observed, it is said, that there had been a good deal of cold weather during the past winter, and, in his opinion, although the day of the accident was a warm one, the previous cold had contracted the metal of the trusses so much as to make it brittle and thus destroy its strength. The superintendent of the railway constructions, under whose care the bridge was built, could give no further information to the reporters than that the trusses were made of "good, substantial material," a delicate compliment to wrought-iron, which, if not new, is no doubt well-deserved; and that the "stringers and rods" were "firmly bolted." Just how they were bolted, and what was their size and disposition, and whether the "substantial material" of the trusses was judiciously distributed, he did not undertake to say, and these points, which, to the professional mind, contain the explanation of the whole matter, must probably be left for judicial inquiry to determine.

MR. WILLIAM H. SAYWARD, the Secretary of the Boston Master-Builders' Association, has made a good many valuable contributions to the subject of the relations of employers and employed, but none, so far as we know, more noteworthy than that with which he is credited in the Boston papers of a recent date. It seems that the granite-cutters of the city and vicinity, who are rather famous for their disposition to strike on small provocation, are now off duty, in consequence of some dispute with the masters. The latter had the good sense to propose to their men that the differences between them should be settled by arbitration, and the men acceded, appointing as their representative Mr. Frank K. Foster, an active Knight of Labor, and recently candidate for Lieutenant-Governor of the State of Massachusetts, while the masters chose as their arbitrator Mr. Sayward. The conference between the two arbitrators went on prosperously enough until a question was raised in regard to the terms which should be agreed upon about the employment of "scab," or non-union labor. This point Mr. Sayward declined to discuss, saying that in his opinion every non-union man was entitled to work wherever he could find employment, and he would not be a party to any infringement of this first principle of human rights. The other arbitrator does not seem to have been willing to waive the matter, and the conference came to an end, much to the disadvantage, as we take it, of the granite-cutters, who will have hard work to agree upon another arbitrator as fair and well-disposed toward them as Mr. Sayward, and still harder work, we hope, in finding any man, not enslaved by the oaths of the labor associations, who will consent to be a party to an agreement, or rather, a conspiracy, for excluding all persons not belonging to a certain society from employment in one of the most important industries in the free city of Boston. It is quite time that society should assert itself in defence of the "scabs," or, in other words, the brave and independent citizens who will submit to no man's dictation as to the amount of work they shall do for the sake of their wives and children, or the wages they shall accept, or the disposition they shall make of their income; and who can now act upon their principles only at the risk of public vituperation, proscription, bruises, mutilation, and even death, and public opinion could hardly have a better counsellor in devising means for preventing the oppression of one set of poor working people by another set than Mr. Sayward.

THE Mayor of New York has appointed Mr. James C. Bayles, the well-known editor of the *Iron Age* and the *Metal-Worker*, to be President of the Board of Health of the city, in place of General Shaler. We are happy to congratulate the citizens of New York upon so admirable a selection. Mr. Bayles has a high reputation as a sanitarian all over the country. His first book on sanitary subjects, the well-known "*House Drainage and Water Supply*," has passed through several editions, and is still, perhaps, the best and most complete work, for the general reader, that has yet been published; while his active and intelligent efforts to enlighten the residents of the suburban town of Orange, where he has a country house, upon matters of sanitation, and to promote improvements in the drainage and public hygiene of the place, have kept him very prominently before the eyes of those interested in such subjects. As the administrator of a very responsible office, Mr. Bayles is likely to show an energy proportionate to his knowledge of the matters to which his duties relate. His successful management of the journals under his charge, as well as of his private affairs, indicates his capacity for business, while the independence and ability of his writing show him to be possessed of opinions which he will not be diffident about carrying into action.

FROM the office of the *Nation* has been kindly forwarded to us a slip cut from the Paris *Temps*, describing an apparatus intended to record the topography of roads by an automatic apparatus, which is set in operation by the movement over the

road to be examined of a small carriage containing the apparatus, and is controlled in such a way by the movements of the car as to register all varieties of level and changes in direction. The mechanism employed is quite simple. The wheels of the carriage set in motion drums, on which are wound strips of paper, and on these strips the record is made. The changes of direction of the movement of the carriage in a horizontal plane are shown by the change of position of the axis of the carriage with regard to a horizontal plate, which is, probably by means of a powerful magnetic needle, kept in a position fixed in respect to the earth's axis; a pencil, attached to the carriage so as to partake of its motion, describing on the paper spread on the magnetic plate below it an arc corresponding to the number of degrees of variation between the direction of each new movement and that which preceded it. Vertical changes of direction, or ascents and descents, are shown in a similar manner by the marks on a roll of paper wound on a drum of a pencil attached to the arm of a double float, which preserves an invariable level. The whole affair, which is called an "autographometer" is the invention of an engineer, recently engaged at Panama in topographical surveys, and seems to resemble the apparatus used in this country on railroads, for recording the characteristics of the line over which the car containing it is hauled.

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THE French technical journals seem to be quite delighted with the report of the Superintendent of foreign mail service in the New York Post-Office, who, after keeping a record of the length of time occupied by the various Atlantic mail steamers in reaching their destination from New York, ascertained that the three new steamers of the Compagnie Générale Transatlantique, the *Bretagne*, *Champagne*, and *Bourgogne*, had all surpassed in average speed any other ships on the Atlantic. A new regulation of the Post-Office Department provides that the rate of speed of steamers whose owners would like to carry the mails shall be ascertained in this way, and the contract for transportation awarded to the fastest ship leaving port on any given date; and in accordance with this rule the French steamers have of late usually taken the mails for the Continent, while on one occasion, a few weeks ago, the mails for England were sent from New York on the *Champagne*, by the way of Havre. This is said to have been the first time that mails were ever sent from America to England by the way of France, and as the three new ships were all built at St. Nazaire, patriotic Frenchmen have some reason to be proud of the success of their countrymen in disputing with England the superiority which the latter country has, until lately, maintained in such matters. The prowess of the Breton builders appears to have stimulated the whole shipbuilding interest in France, and one of the fruits of the sudden impulse is to be seen in the opening of an international maritime exhibition at Havre. The buildings for the exhibition are, by a happy inspiration, placed around a huge dock, in which are to be collected examples of interesting naval constructions; the Government, which is one of the principal exhibitors, sending a corvette in complete order, with arrangements for exhibiting on board the details of modern naval hygiene; while marine engines, models of vessels, steering, hoisting and propelling apparatus, ship-builders' tools, and the small accessories of maritime life will occupy the buildings. With a fancy that is rather more ingenious than artistic, the main entrance to the exhibition is marked by a dome, forty or fifty feet in diameter, which is made to represent a globe, engaged, as far as the Tropic of Capricorn, in the adjoining roofs, but showing most of the civilized world on the exposed portion of its surface, and carrying a fine collection of flags on its elongated North Pole. Of late years the commerce of French ports has diminished greatly, that which once kept Havre busy having gone to Antwerp, while much of the Mediterranean trade has forsaken Marseilles and gone to Genoa; so that the interests of the seaport towns need, almost as much as they do with us, the encouragement which such an exhibition will give; and we do not doubt that its results will be such as to gratify its public-spirited promoters.

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A NOVELTY in competitions is in progress in England, where the Government of the new Imperial Institute has undertaken to call the services of architects to its aid. The Institute, which is a very dignified corporation, proposes to erect, on a site some six and one-half acres in extent, an immense building, to contain exhibition galleries, conference rooms, emigration offices, and so on; and invites architects willing to compete for the work to send to the Secretary their names, together with a list of the important public buildings which they have designed. Out of the applicants six will be selected, under professional advice, who will be furnished with instructions, and allowed three months to prepare their designs; and one thousand dollars will be paid to each competitor for his trouble, provided his design is found to be in accordance with the instructions. A competent committee, to which the competitors may, if they choose, add a professional assessor, chosen by themselves, will then select from the designs the one which best meets the requirements of the case, the inference being that the author of this will be employed to carry it out at the usual remuneration.

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NOT long ago we quoted some of M. Trélat's striking observations on the effect of light on the occupants of dwelling-houses, and the importance of illuminating rooms by windows carried as near the ceiling as possible, and not obscured by curtains. These suggestions seem to have made a considerable impression in France, and Dr. Hector George, a well-known writer on hygiene, recently delivered a lecture on the same subject at the Paris Conservatoire des Arts et Métiers, in which he spoke with approbation of M. Trélat's paper, and added some curious information from the stores of his own knowledge. As reported in *Le Génie Civil*, Dr. George remarked that light was found to be an indispensable stimulant to vital action. Among plants, the sensitive mimosa, which presents the nearest approach to voluntary motion to be seen in the vegetable kingdom, loses its irritability in darkness. It recovers it again by exposure to light; but if deprived of light for six days, the plant is so far enervated that it cannot be revived, and it dies. With men and animals the red blood-globules are formed only under the influence of light, and disappear by absorption if the subject is kept in darkness. For this reason butchers often keep calves in dark places, to render their meat white, and miners, silk-weavers, and other persons who pass their days in obscurity, become pale, inert and "bloodless," as is the common phrase. With the development of red globules, by the effect of light, strength and spirits return. The red globules perform the function of carrying the oxygen of the air from the lungs to the different parts of the body, and when they are abundant there is a sensation of life and activity, a good digestion, full respiration, and cheerful temper. Besides the influence of light upon the respiration and oxygenation of the blood, it acts powerfully on the skin, exciting its action, tanning or burning it to a brown color, and even causing the inflammatory condition known as sunstroke, which, as Dr. George says, is shown to be produced by light, and not by heat, from the fact that it is caused by the reflection of sunlight by water, which sends back the light, but not the rays of heat.

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IN eruptive diseases the action of light on the skin is such as to aggravate the inflammation, and physicians keep their small-pox patients in a dark room, or cover their faces with lamp-black paste, to moderate the eruption, and lessen the scars which it leaves behind it. The influence of light in promoting bodily activity is well understood by farmers who keep in darkness the oxen that they wish to fatten, the cows whose yield of milk they wish to increase, and the setting hens which show too lively a disposition, in order to secure the quiet, sluggish state which promotes the objects they have in view. On certain inferior animals the action of light is sometimes unfavorable, and it has been observed that the microbes of infection and fermentation are destroyed, not only by a free exposure to air, but by light alone, so that sunshine, independent of its influence in setting up currents of air, has a purifying power of its own, the extent of which we do not as yet know. In the care of young children, the effect of light is a matter of great importance. In dark or shaded houses development goes on imperfectly. The tadpole, without sunshine, lives always a tadpole, never showing any disposition to abandon its gills and tail; and the effects of deprivation of light in checking growth in infancy remain visible throughout the life of the individual. Children naturally love the light, and fear darkness. A baby in its cradle always looks toward the window, so that unless its face is turned either directly toward or away from the light it is apt to acquire a permanent deviation of the eyes; and the terrors of children in dark rooms indicate a physical condition which may result in serious injury if the distress of the nerves is not relieved by lighting a candle or lamp.

## PICTURES OF THE SEASON IN NEW YORK.—I.

EXHIBITIONS of various sorts and sizes have been numerous this year and, as a rule, have seemed to interest the public. Those which revealed American work have contained few remarkable pictures, but have shown a fair average: and comparatively low-priced works have been generously purchased. The shops have been filled with a succession of the good foreign products of to-day, but at last there seems to be a dearth in the market of the still better foreign products of yesterday. Really representative works by the great French masters of the last generation are not so easily to be secured as a few years ago, even by those whose purses are phenomenally well filled.

The first exhibition of the season, if I remember rightly, was that of the so-called Sharples pictures. It contained a number of portraits of charming young ladies with high-sounding names, said to have been completed by Maclise and other English painters, from sketches made by Sharples in New York and Philadelphia in the earliest years of the century — smooth, gaudy, chromo-looking works, with no artistic, and but questionable historic value; a portrait of a very beautiful woman, also devoid of artistic merit, which was asserted to be the only existing likeness of the mother of Washington; portraits of Robert Fulton and of Dr. Priestley, which were good, though not remarkable works of art; and two portraits of Washington and one of his wife which were extremely good and interesting works of art. These last three were said to have been painted from life by Sharples, and at the time when they were exhibited a bulky volume was published by the gentleman who had brought them from England, giving what purported to be their history accompanied by a mass of documentary evidence to sustain their authenticity and prove their value. As this book was not immediately challenged by professed historians its bold assertions were accepted on faith by too many of those who felt the intrinsic charm of the three Washington pictures. Many voices pronounced them the most satisfactory likeness of their subjects that exist, and urged their purchase for the American people. Fortunate were those who confined the expression of such sentiments to words. Those of us who were rash enough to put them forth in print have since been under the sad necessity of retracting all commendation of the portraits save such as concerned their intrinsic worth as paintings. For their showman, in a what proved to be a very rash moment, appealed to the Massachusetts Historical Society to endorse them: this Society appointed a committee of investigation, with Francis Parkman at its head; and this committee, though strongly prepossessed in favor of the pictures, soon found that the documents upon which their claims were based were a mere tissue of falsehoods, fables, and forgeries. Their elaborate dissection of Major Walter's book was simple enough in its processes and clear enough in its outcome to convince the most ignorant reader of the justice of their verdict. This verdict was that the three chief portraits may have been painted upon some crayon basis furnished by Sharples, but were not painted by him from life; that when or by whom they *were* painted cannot possibly be shown from any evidence in hand; and that the portrait of Mary Washington has no shred of a title to authenticity. No real answer to any charge in the indictment has been published by Major Walter, and it is said that he has now returned to England taking his whole collection with him and leaving naught but his extraordinary book to preserve the memory of one of the most bold-faced, yet stupid attempts that have ever been made to trade upon an appeal to our patriotisms and our love of art. Sometimes it seems unfortunate that, as a nation, we are so slow to respond to such appeals. But in this case our lack of touch-and-go enthusiasm has certainly been lucky. The only pity is that this experience may make us still more cold and distrustful than of yore on possible future occasions, when ready enthusiasm would really be desirable.

Autumn exhibitions of American work were opened in October both at the American Art Gallery and at the Academy. The former contained a few good large pictures by "new men" in Paris, and the latter, at least, one very excellent canvas — Mr. Winslow Homer's "Lost in the Fog." But neither was, as a whole, very interesting, and neither was as rich even in "promising" works as might have been hoped.

The winter exhibition at the Metropolitan Museum, on the contrary, showed many things of native origin that were distinctly fine. Not all of them were new, but all of them were recent, and the impression they made was most consoling if one had been accepting the two down-town exhibitions as true signs and symbols of the current status of American work. In another part of the Museum were shown, at the same time, a number of "Old Masters" which had been brought from Paris and loaned for a brief period by M. Sedelmeyer. The names they bore were of the highest sound. Rembrandt and Ruysdael, for example, were each credited with several large canvases, and Terborg, Hals, Tiépolo, Watteau, Greuze, Van Eyck, Rubens, and Murillo were among the other great men whose products we were bidden to admire. But if we did not admire unreservedly, the fault was not in our eyes. Some of the pictures — as, for instance, a dual portrait by Sir Joshua Reynolds, two heads, by Greuze, a Venetian scene, by Canaletto, and a Terboog seemed to be genuine, though not exceptionally excellent examples. But many other works were, at least, dubious — if authentic were certainly not very good; and others, like the Rembrandts, had little evidence to give in their own behalf. A portrait resembling those of Rembrandt's wife was apparently a good example of the work of one of Rembrandt's best scholars; but of its companions not even so much as this could be said. As a whole, the collection was not a fine one, nor did it contain a single first-class picture. I have seen worse collections of Old Masters in private palaces abroad, and even in small local museums; and there is a much worse one owned by the Metropolitan Museum itself. But it was hardly good enough to be worth the trouble of importation, and could not have been really instructive to untravelled eyes.

The only important picture that has recently been given to the Museum is a canvas 12 x 18 feet in size, and valued at $20,000, painted by Brozig, and presented by Mr. Morris K. Jesup. It represents Columbus at the Court of Spain, and, though a clever enough piece of painting, is academic, uninteresting, and almost without value as a help towards popular education in art.

As Brozig is the son-in-law of M. Sedelmeyer, as this gentleman brought the picture over with Munkácsy's famous "Christ before Pilate," and as he has also sold this and sundry smaller works to a citizen of Philadelphia, he, at least, will not return home with a feeling that America is disinclined to foster the arts. The exhibition of the "Christ before Pilate" has been going on for months. But its success has been a *succès de curiosité* rather than a genuine artistic triumph. All the metaphorical blare of trumpets with which it was heralded, and all the very literal blaze of theatrical arrangements, amid which it has been shown, have not blinded us to the fact that it is not a great picture, or a satisfactory conception of the theme, but simply a very clever, effective piece of brushwork, feeble in idea and in sentiment alike. I think it is one of the most cheering among recent signs of our growth in artistic feeling that such should have been the case. A big book filled with laudatory comments from the press of every European country was industriously circulated by M. Sedelmeyer when the exhibition was opened. But a similar book could never be made up from the notices that have appeared in print on this side of the ocean. And even private conversation has proved a very widespread disappointment with the work. Its pictorial shortcomings — its weakness in composition and in dramatic force — are more generally noted than one might have thought would be the case; and even when these are not distinctly perceived its lack of genuine feeling has been clearly recognized.

Munkácsy himself followed his picture to New York, was something of a "social lion" during his stay, and executed certain portraits which, I hear, are fine examples of his technical skill, and for which he received such enormous prices that we may assuredly look forward to an influx of French artists during the next few years. Indeed this winter we have had others among us. M. Rénouf, well known through his fine "realistic" picture of a child in a boat with her grandfather, called "A Helping Hand" came early in the winter, bringing a few portraits with him, and desiring to paint others here. What success fell to his lot I do not know. But M. Rajon, the famous reproductive etcher, has gone home so well pleased with his stay that he intends to return next year. He did no etching while here, but studied at least one picture — Jules Bréton's "Last Ray" — which he is to etch in Paris under the painter's own eye. And he executed two or three charming portraits in pastel, and made, in Goupil's gallery, a delightful exhibition of his work, which contained many of his finest etchings, as well as a number of very spirited and charming small portraits in black or red crayon. His large etching of a portrait of Darwin, from a painting, I think, by Mr. Ouless, was the great feature of the collection, and as splendid a piece of work as this art, in its reproductive phase, has ever produced.

The Black-and-White Exhibition, under the auspices of the Salmagundi Club, was this year not of much interest. Sketches and studies are chiefly what one wants in work of this sort, and methods which do not compete with oil-painting in colors, but have an individuality and a charm of their own. But a majority of the works exhibited this year were in black-and-white oils, and seem to have been executed with a wish to realize the elaborateness, the depth, the intensity and the completeness of tone more proper to work in color. There was much clever execution to be noted, but a great deal of it was wasted in this vain effort after the unattainable. The collection of architectural drawings, shown at the same time under the auspices of the Architectural League, was infinitely more interesting. It was weak in its showing of contemporary products in brick and stone, but strong in its showing of various styles and draughtmanship. A few of Mr. Stanford White's water-color sketches — extraordinarily delicate, yet virile in execution and marvellously lovely in color — stood out above all their surroundings. But they were almost rivalled by the larger water-colors recently sent home from Europe by Mr. Mead. A number of this young artist's

pencil-drawings were also shown, and I need hardly tell the readers of this journal how extremely good they were—how individual in method, how succinct, yet clear and truth-telling, how brilliant, how thoroughly artistic. But in this exhibition one saw, for the first time, what a great gift for color he also possesses—a gift so great that one can but hope he will devote himself for life to the study and practice of that decorative art, the very name of which has become almost an offence, so constantly is it still practised without study and by those who have no slightest claim to architectural knowledge, and apparently but small respect for the architect's precedent labors.

Very different from these water-colors in aim, and consequently in effect, but also extremely good in their own way, were a long series by Mr. Marschal, reproducing the interior decorations of the Palace of Fontainebleau. No transcripts of such a kind could have been more detailed, more precise, more thoroughly explanatory. Yet they were not mere conscientious documents, valuable only for the evidence they gave about the work they reproduced. They had an intrinsic charm as well, being distinctly non-mechanical in handling—showing a freedom and grace of touch that was quite wonderful, considering their smallness of scale and fulness of distinct detail.

I should have noted that in the Black-and-White Exhibition proper were included the originals of Mr. Cox's designs for the "*Blessed Damozel*" and of Mr. Abbey's "*She Stoops to Conquer*"—two of the most-successful Christmas books of this or any season. The former were large monochrome oil-paintings, but the latter were drawings in pen-and-ink, of the most delightful description. They were by far the best feature of the exhibition alike in dramatic, human interest, and in consummate skill of execution.

M. G. van Rensselaer.

## PARIS CHURCHES.[1]—IV.

### ST. MARTIN DES CHAMPS, ST. MERRI, AND ST. SÉVERIN.

STRICTLY speaking, St. Martin des Champs is no longer a church; but as the remains of the ancient priory are important, and the buildings in the best style of the thirteenth century, they are well worth studying. St. Martin des Champs is the only conventual building of Paris, which retains its original physiognomy; and although it is perverted into a museum, it still contains within its precincts, a walled-in entrance-court with one of the original corner turrets, part of the cloisters, the refectory and the church. Formerly hidden away in the narrow rue St. Martin, it has gained in pictorial importance since the piercing of the new Boulevard Sebastopol.

Although the priory ranked after all the abbeys of Paris, it was well-nigh as important, and as rich. The prior enjoyed a revenue of 45,000 *livres*, and had the right of nomination to sixty beneficies, twenty-nine priories, and many curacies and chapels.

Tradition records that the monastery was built upon the site of one of St. Martin's acts of charity: healing the leper. Born in the reign of Constantine the Great, at what is now Stain, in Hungary, Martin early became a Christian, but his parents being Pagans, he was not baptized until comparatively late in life. His father was a Roman soldier and tribune, and the son was enrolled in a cavalry legion. Obliged to leave his native country for Gaul, we find him in the year 332 quartered at Amiens; and here it was that he performed the act which has made him so famous in literature and art—the cutting of his cloak in two, to clothe a starving beggar. Martin Schoen gives him such a voluminous mantle that one feels the act of cutting it in halves to have been that of a highly-practical mind—enough for you and enough for me. But other painters, on the contrary, depict the cloak as of such very small dimensions, that one only wonders the saint did not give it all to the beggar, for half of the garment could scarcely have benefited either party. This act brought him commendation from Heaven, and he hastened to receive baptism, being then twenty-three years of age. At forty he left the army, and was elected Bishop of Tours; and again we read of a similar story of clothing the naked, this time with his sacerdotal vestment during the celebration of mass.

St. Martin founded many churches and monasteries, and many more were dedicated to him after his death: Marmoutier, near Nantes, was a very celebrated convent, and in England there are a great many churches of which he is the patron. When St. Augustine went to Britain, he found a chapel in the neighborhood of Canterbury, which had been dedicated to St. Martin in the fifth century, and there he baptized his first converts. The church is certainly one of the earliest in England, and the font cannot be later than the eleventh century; but whether it is the identical one in which King Ethelbert was baptized in the seventh century, is doubtful. Still, though much restored from time to time, the church retains numbers of Roman bricks incorporated into its walls. That Queen Bertha worshipped in a church on the same spot is certain, and tradition points to the stone coffin in which she lies.

To return to St. Martin, the legend relates that when he was entering Paris as Bishop of Tours, he met a wretched leper at the gate, and filled with compassion and love, he embraced him, and thus healed him of his leprosy. To commemorate such deeds, two churches were not too many; but it was not until 1060 that the monastery was founded under Henri I. Phillippe I dedicated the church in 1067, and placed the new foundation under the patronage of the Abbey of Cluny. It was originally situated as it name implies, amongst fields; and its domains consisting of several acres of land which became more and more valuable as time went on, it was naturally enormously rich. Amongst its long list of priors, are many illustrious names; at first regular and latterly titular, of which latter class the Cardinal de Richelieu was one.

The only demolition that is much to be regretted is the Chapel of St. Michel, which Nicolas Arrade founded in the thirteenth century. Intended as a family vault, it contained, a hundred years ago, more than thirty tombs of his descendants. These have been destroyed since the departure of the monks; but to them we owe the destruction of the chapter-house, the tower, the lady chapel, and several royal statues; and the rebuilding of the cloister, which is now "ornamented" with Doric columns was their work. This vandalism was perpetrated rather more than a century and a half ago.

The church belongs to two distinct periods. The nave was built about the middle of the thirteenth century, and is without aisles or pillars. It is lighted by pointed windows, and covered by a pointed timber roof. The choir and apse belong to the middle of the twelfth century, and are peculiar in their arrangement. The apse is raised from the nave, and round it on a lower level are double aisles, divided by clustered columns which support the vaulting. Thus, the apse is approached from the nave by steps in the usual manner; but to enter the aisles of the former, one has to descend three or four steps from the nave. The whole has been decorated with color, and if restored to its proper use, would be, after the Ste. Chapelle, the most interesting church in Paris. As it is, its desecration shocks the feelings of all but the materialists, and the noise of the machinery in motion is distracting to the nerves of the student. Surely a better and more appropriate building might be found in which to place hydraulic machines, ploughs and shafts worked by steam-power.

The refectory is one of the *chefs-d'œuvre* of the thirteenth century, and quite worthy of Pierre de Montereau, to whom tradition assigns it. It is divided into eight bays in its length, the vault springing from seven central pillars. These tall elegant shafts divide the buildings into two naves of equal width. The windows on one side are blocked up; on the other, they consist of two lights with a rose above. Mr. Fergusson, in his "*Hand-book of Architecture*," gives a sketch of one of these windows, page 697, Figure 564 (Ed. 1855). The carving of the capitals and bosses is exquisite. On one side is a reading-pulpit built into the wall. This is approached by a stone staircase in the wall, which is pierced by a narrow, lancet-shaped open arcade to give light. The pulpit is lighted from without by three windows. The refectory suffers less than the chapel from its change of hands, being used as the library of the museum. On the south wall is a painting in fresco by M. Steinheil of St. Martin dividing his cloak, which harmonizes very well with the coloring of the rest of the building. All the other parts of the museum are modern.

### ST. MERRI.

At the bottom of the Rue St. Martin is a spot which, during the ages of faith, was much reverenced for its miracle-working powers. In the seventh century, the whole district was a forest, and doubtless the king and courtiers hunted there; for when first the Louvre was built, it was a mere hunting-box. Paris consisted only of the present Cité—the island on which stands Notre Dame—and beyond, the country was no doubt infested with wild animals, as well as game. In the midst of the wood stood a little chapel dedicated to St. Peter, which was as much surrounded by trees and shrubs as the present church of St. Merri is by streets and houses. Adjoining this church was a cell, or hermitage, and it was there that St. Merri, and his disciple, St. Frodulphe, sojourned when on their way from Autun to the

[1] Continued from page 253, No. 570.

shrines of St. Deny's and St. Germain. St. Merri was abbot of Autun, but he seems to have been glad of a change to the great city; for so it befell, that instead of returning to his abbey, he stayed in this little wooded retreat, undisturbed by aught but the singing of birds and the sighs of the trees, for the space of three years. Then, on the 29th of August, about the year 700, he died, and was buried in the chapel. Many and wondrous were the miracles wrought at his tomb; and so famous did it become, that St. Peter's patronage was forgotten, and the church was looked upon by the people as being under the exclusive protection of St. Merri.

About the end of the ninth century, Eudes de Fauconnier desired to celebrate his part in the expulsion of the Normans from the neighborhood, by erecting a new church on the site of the little chapel, or in its immediate neighborhood. This was dedicated to the two saints, St. Merri being placed first. When this church, in its turn, was demolished in the time of François I, the remains of the founder were found in a stone coffin, still shod in his leathern boots. In the twelfth century the church became a parish one, and in the next century it was made collegiate. A strange custom prevailed in the Middle Ages, of affiliating one church upon another. Thus, St. Germain des Près was called the "third daughter" of the Abbey of Cluny; and in the same way, St. Merri was the third daughter of Notre Dame, whose canons were connected with the daughter church. The chapter of St. Merri consisted of a *chefceir* who filled the place of the *curé*, six canons and six chaplains.

The existing church was built 1520–1642. The exterior is the best part. Covered with ornament in the Flamboyant style, the west front, with its three portals, is a good example of rich ornamentation of the usual kind. The statues in the niches were placed in 1842, replacing those destroyed in the Revolution. Those round the *voussure* are copied from one of the portals of Notre Dame, and consequently are two centuries too early for the church. Another blunder of the modern architect is the placing of a demon in the centre at the point of the arch, where the mediæval artists invariably put the figure of Christ or of Our Lady. The woodwork of the great door has not been renovated, and is quite worth studying for its fine carving. The lower part of the tower is contemporary with the church, but the upper stories have been rebuilt in the seventeenth century, and consist of Renaissance arches and shafts. Much of the tracery of the windows has been destroyed, but the pinnacles and gargoyles remain. Built on a cruciform plan, it has two other doors, but the presbytery hides all but the crowning pinnacle of one. In fact, like many Continental churches, it is so built about by surrounding houses that one only gets a view of it here and there. It is extraordinary that in such a city as Paris this is tolerated. I think it is at St. Germain l'Auxerrois that a wooden hut is built in between the buttresses of the east end, completely filling up two windows of the apse. The whole erection is in wood, so it could easily be taken down. The hut is supported on great wooden piles, and approached by a sort of ladder. Such a state of things only exists in Catholic countries, and the more Catholic — as, for example, Belgium and Spain — the more complete the desecration.

The havoc made in the interior of the church by the eighteenth-century architects is deplorable. Windows have been destroyed, piers have been stuccoed over, and pointed arches turned into round ones. The pillars are late Perpendicular, or rather Flamboyant shafts without capitals. But around the nave, between the arches and the clerestory, runs a little frieze of foliage and quaint birds and beasts, a feature which is not common. All the bosses of the choir and apse are very richly decorated, and the vaulting is good, but both the choir and the *chevet* have been sadly "improved." About 1753 the brothers Slodtz were commissioned to convert the thirteen pointed arches of the choir into round ones, and to encase the pillars in panellings of stucco, which was marbled and gilt, the last bay being profusely decorated with golden sun-rays. One of these unfortunate brothers, Michel-Angelo by name, designed the pulpit, a mass of palm-tree decoration, surmounted by a female figure of Religion; and to place this, a whole bay of the nave had to be demolished. The year following three chapels were destroyed to make room for the new square, barn-like chapel of the Communion. The modest sum paid these miserable, so-called artists, for hacking the church to pieces, was 50,000 *écus*.

The crypt is most interesting, and is said to have been a reproduction of the original one. It was used for some time as a workshop, by the cleaners of the church, and was the depository of brooms, brushes and lamps. It has a stumpy central column, from which spring the ribs of the vault; and the capital is ornamented with vine-leaves. The crypt is square, divided into four parts. A few remains of recumbent tombs can be seen in the pavement; but of the monuments of Arnaud de Pomponne, ambassador of Louis XIV, and of Jean Chapelain, the author of "*La Pucelle*," nothing remains. The crypt, with its solid central pillar resembles that in the Louvre, of Philippe Auguste, lately brought to light. The famous mosaic Madonna, by master David, which Jean de Ganay, a parishioner of St. Merri, brought from Florence in 1496, is now in the Hôtel Cluny.

Much of the old glass has gone, the central portion of each window having been taken away, to throw more light upon the marbled stucco. What remains is in good sixteenth-century style, the work, probably, of Héron, Jacques de Paroy, Chamm, and Nogare, whom Levieil records to have been the artists employed. The subjects are from the history of SS. Peter, Joseph, John the Baptist, and St. Francis of Assisi; but it is most difficult to follow the designs, as not only are there the gaps of plain glass, but what was taken out has been used for repairing the others.

The church possesses a very curious holy-water stoop, of the time of Louis XII. It is about three feet high, octagonal, upon a slender shaft which stands upon a square base. The upper part is decorated with the arms of France and of Bretagne, and the instruments of the Passion. It is as large as a small font, and far more like one than a stoop. A small amount of carved woodwork (Renaissance) remains; fragments of stalls, sculptured columns, pilasters, children, birds, and so on, and a wondrous sixteenth-century painting on wood, representing St. Geneviève sitting in a sort of Druidical circle surrounded by her flock. It is the only combination I can remember seeing of the mystic circle of stones of Paganism and a Christian saint.

### ST. SÉVERIN.

St. Séverin is particularly interesting as showing a gradual development from the thirteenth to the sixteenth century. Founded on the site of an oratory by Henri I in 1050, it was rebuilt at the end of the eleventh century. There were two Saints Séverin; one, the founder of the abbey of Châteaulandon, who miraculously cured King Clovis by placing his chasuble upon him; and the patron of this church, who was a monk, or rather a hermit, living in the sixth century during the reign of Childebert I; he dwelt as a recluse in a hermitage at Paris, and gave himself up to pious exercises, and prayers, and supplications. Considering the brutal manners and customs of these early kings and their friends, it is a blessed thing that some of their contemporaries cared for other matters than fire and sword and pillage. St. Séverin was one of these; and so well did he preach his pacific faith that St. Cloud or Clodoaldus, the grandson of Queen Clotilda, became a disciple, and received the religious habit from him. St. Cloud was the youngest of three brothers. Wicked uncles murdered the elder two, but Clodoaldus managed to escape their wrath. What brigands they all were! Imagine a woman having to decide whether her grandsons should become monks or die? No wonder monasteries flourished, for where else was there any culture, or enlightenment, or civilization? And yet Clotilda must have had a reason for her passionate answer, "Better they were dead than shaven monks"!

St. Séverin was probably buried near the oratory, and what more natural than that the disciple should consecrate the spot to the memory of his master? In 1050 Henri I gave up the patronage of the foundation which had, before that time, belonged to the kings, his predecessors, to the then Bishop of Paris, Imbert. At the end of the eleventh century it was the headquarters of an enormous parish extending almost over the whole of the southern side of the city. It is now in the midst of the Italian population, models, organ-grinders, plaster-image sellers, and others; and it is a pretty sight on Sundays and fête days to see the church filled with the inhabitants of the sunny south decked out in their holiday attire. How a group of people alter the whole aspect of affairs, I had once brought before me most vividly in St. Paul's, London. Walking down that very dismal nave, it seemed suddenly to be quite lighted up by a foreground group of three Italian women and some little children dressed in violet, emerald-green, and crude blue garments — hideous colors by themselves, but allied to the snow-white chemises and trimmed with gold braid, they seemed to completely change the appearance of the church, and put it right. St. Paul's is essentially Italian, and thus, under the London gloomy sky, and decorated with men and women clad in blacks and browns, it is utterly *dépaysé*.

The present church of St. Séverin was reconstructed in the thirteenth century. In 1347, and again in 1458, the Pope accorded indulgences to the faithful who contributed to the church building-fund. The first stone of the new part was laid in 1489, and the chapel of St. Sebastian was built three years later. In 1490 the chapel of the Conception was demolished to make way for the enlargement of the aisle. In 1495 Jean Simon, bishop of Paris, consecrated the new portion of the church — the high altar, and many of the side chapels. In 1498 the chapels on the south side were commenced by Micheaul le Gros; the sacristy was added in 1540, and the chapel of the Communion in 1673. Thus, for four hundred years the church was undergoing constant change and development. Then began the downward path, commencing with the destruction of the *jubé* and the ornamentation of the sanctuary in the style of St. Merri. Originally, many of the Paris churches had *jubés*, a species of rood-screen, but the only one now remaining is that of St. Etienne du Mont.

Were it not for the elegant little tower and spire few persons would know of the existence of St. Séverin. It is out of the beaten track, beyond Notre Dame, and the "monuments" of the Faubourg St. Germain. It has to be hunted up — but it is well worth the trouble, and any one visiting the arena in the Rue Monge (the remains of the Roman occupation of Lutece) can see it at the same time. On the stylobate of the portal is a strange inscription, or rather the remains of one, in the thirteenth-century letters, giving the divers duties of the grave-diggers; amongst others, the cleansing of all the vaults (of the roof), and all the rest of the church on the festival of St. Martin, as the dedication festival fell two days after. It is a pity that restorations have almost destroyed this relic of a Mediæval epigraphe. As in many other churches there are two lions on each side of the arch, probably the supports formerly of some heraldic shields; this, no doubt, is the origin of the formula, which terminates certain ecclesiastical judgments pronounced at the threshold of the temple; *datum inter duos leones*. The tympanum bas-relief has been restored;

it represents the charity of St. Martin, who is one of the patrons of the church, and whose mutilated mantle, or a portion of it, has been one of the cherished relics of St. Séverin since the fourteenth century. There is also a chapel dedicated to the venerable and self-denying bishop of Tours, which was formerly completely covered with *ex-voto* horse-shoes, the gifts of thankful travellers; for St. Martin, having been on horseback when he divided his cloak, became the patron of the travelling community. The western façade is composed of portions of the portal of St. Pierre aux Bœufs in the Cité, which was demolished in 1837, and is, the little which has been left unrestored, of the thirteenth century. The whole belt of chapels, as well as the greater part of the nave, is of the fifteenth and sixteenth centuries. The first three bays of the nave are of a totally different style; the form of the arches and of the windows show the work of thirteenth-century architects. At the northwest angle of the chapels an elegantly-carved niche, with a canopy, encloses the patron saint bearing a crozier in his hand. Above and around him are gargoyles of grotesque animals and birds, while near him is an inscription inviting the passers-by to pray for the souls of the departed.

*Bonnes gens qui p cy passes*
*Pries Dieu pour les trespasses.*

The last word has been mutilated — perhaps by the hands of the Huguenots.

The interior consists of a nave and double aisles. The triforium is very similar to that of Westminster Abbey church; but at the commencement of the choir, the thirteenth-century arches have been filled up and the pillars marbled over into piers. Some of the capitals and corbels of the south side aisle are most odd — prophets, flying angels, and animals grinning from behind foliage, like the carved miserere seats in Gothic churches. During the reign of Henri IV sibyls and prophets, patriarchs and apostles were painted by one Jacques Bunel on a gold ground above the arches of the nave; but, happily, they have disappeared. It was Michael de Montpensier who caused the marbling of the choir to be undertaken in 1684, and who also bore the expense of the baldichino of the altar. Tubi was the sculptor, Lebrun supplied the designs.

In the side aisle, on the south, is a little door leading through a garden, formerly the graveyard, to the *presbytère*. This, in summer, forms a charming little picture. In one of the side chapels is a fifteen-century wall-painting of the Resurrection of the Dead; and in the chapel of the *chevet* a preaching of St. John the Baptist, also in fresco. In the apse are a series of fluted and spiral columns. The bosses are many of them ornamented with figures — the Annunciation, St. Anne and St. Joachim at the golden gate, a holy face, and a chalice surmounted by the host.

There are only three ancient epitaphs remaining — that of Nicholas de Bomont, who died in 1540; Guillaume Fusée, president of the Parliament of Paris, and of his wife, Jeanne Desportes, who made several pious foundations in 1521; and Jean Baptiste Altin, conseilleur au châtelet, who died in 1640. The first, Nicholas Bomont, his wife, and fifteen children are represented as pigmy personages praying at the foot of the crucified. The emblems on Altin's are singular, as having been borrowed from the symbolism of the catacombs. A modern inscription relates that the first confraternity established in France, was at St. Séverin, in 1311, under the name of the Immaculate Conception. The organ and iron gallery are handsome, but only date back to 1747, having replaced earlier ones of 1512; but the first instrument was given in 1358 by Master Regnaud de Douy, governor of the great schools of the parish: it was *une bones orgues et bien ordenées*. The glass is all of the fifteenth and sixteenth centuries, and not in any way remarkable. Amongst the subjects is a St. Thomas-à-Becket celebrating his last mass, surrounded by his murderers; this sainted martyr having a chapel dedicated to his memory in St. Séverin. There are several modern pictures in the chapels, two by Flandrin, but not in his best style; we must go to St. Vincent de Paul to see his master-pieces. S. Beale.

## Illustrations

*[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]*

THE ROTCH TRAVELLING-SCHOLARSHIP DRAWINGS. — PLATES XLIII, XLIV, XLV.

[Issued only with the Imperial edition.]

CAPE COD SKETCHES NO. 4. — THE HOUSE OF CAPT. JOHN KENDRICK.

THE early days of John Kendrick the builder, and for a time, occupant of this house, are veiled in obscurity, further than that he was a Cape Coder. That he built and lived in the house is an historic fact, and that he was a distinguished navigator is beyond all question, making foreign voyages from whence he brought many costly furnishings for his house, which in itself to-day shows a type of ancient foreign order of architectural designs — the old German tile around the old open fireplace, etc. In the year 1787, some enterprising Boston merchants, Borsell, Brown, Bulfinch, Darby and Pintard, conceived the idea of establishing a trade on the Northwest Coast, consequently they fitted out the ship "*Columbia*" of two hundred and twenty tons, and the sloop "*Washington*" of ninety tons, and loaded them with blankets, iron bars, knives, copper pans, etc., for trade with the Indians. John Kendrick commanded the "*Columbia*" and the expedition, and Robert Gray commanded the "*Washington*." At the time copper medals were struck off, representing the ship and sloop, with Capt. John Kendrick's name on one side, and the name of the owners on the other. The expedition sailed from Boston on the 30th of September, 1787. On the 17th of September, 1788, an opening was discovered on the coast, which proved to be a great river, to which Captain Kendrick gave the name of the Columbia River (the name of his ship), and it was here that the sloop grounded and was boarded by the natives, and several of the crew were murdered. Shortly after this occurrence, Captain Gray was transferred to the "*Columbia*," and at once sailed for Boston by the way of Canton, leaving Kendrick on the coast in charge of the sloop, and it was thus that the ship "*Columbia*," of Boston, carried[1] for the first time the American flag *around the world*. The "*Columbia*" and the "*Washington*" were the first American vessels that ever visited the northwest coast. Captain Kendrick remained on the coast until the return of the "*Columbia*," Captain Gray, from Boston, when they set sail for the Sandwich Islands, where he opened the first traffic with the natives for sandal wood, etc. In the year 1793, the brave Captain Kendrick was murdered by the natives, and thus ended the career of a brave and brilliant man of that period.

It was said of Captain Kendrick by his neighbors, that he loved, and was also liberal with his choice wines which he brought from foreign lands, and when at his Wareham home he was daily seated in the front hall of his dwelling with open doors at eleven and four o'clock, and would hail all passers by to step in and help him "splice the main brace." Many anecdotes in days gone by were related concerning Captain Kendrick, and we will relate one to demonstrate the extremes of the characters of man and wife, Captain Kendrick possessing almost an ungovernable passion, while his wife was gentle, lovingly mild and amiable.

The Captain one day was fixing matters around the fire preparatory to taking a drink, while his wife was at the same time using the embers for heating her flat-irons, when something displeased the Captain, he took one of the irons from the hearth, and hurled it through a large elegant French mirror, dashing it in myriads of pieces, when Madam admonished him thus, gently, "Why, my dear Captain, I fear you have broken the handle of my *flat-iron*."

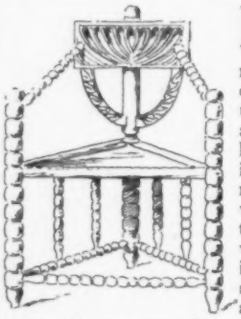
HOTEL AT FOREST GLEN PARK, NEAR WASHINGTON, D. C. MR. F. SCHNEIDER, ARCHITECT, WASHINGTON, D. C.

HOUSE OF SOL. SMITH RUSSELL, ESQ., MINNEAPOLIS, MINN. MESSRS. WAITT & CUTTER, ARCHITECTS, BOSTON, MASS.

COUNTRY HOUSE. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N.Y.

PROPOSED HOUSE AT FLATBUSH, L. I. MESSRS. STUCKERT & DIETRICH, ARCHITECTS, NEW YORK, N. Y.

## UTILIZATION OF TOWN SEWAGE BY IRRIGATION.[2]—II.



AN OLD WARWICKSHIRE GAIR.

I WILL now give you my experience as to the proper crops for a sewage-farm. They are simply rye grass and roots, with a crop of cereals once in six or seven years, and whilst cereals are under cultivation, no sewage should be applied to the land at all. The soil having been prepared, as I mentioned in describing the character of the carriers and the pickups, it should be sewn with rye grass in the early autumn, so that the young plant may be fairly developed before the frosts of winter set in. It may be treated as I have described, with five thousand tons of sewage per acre per annum. It will enable the manager to take at least five crops off that field in the ensuing year, and if the season is a warm one, sometimes six or seven. Sewage-farmers sometimes ignore the fact that rye grass is a biennial, not a perennial plant, and that if it be allowed to get well into flower, it will cease to provide more green material, and the sewage will not be purified to the extent that would be the case if the plant be cut as soon as there is the slightest appearance of flower in the field. If this treatment is steadily pursued, the cropping may go on for two years, or even for a third year, but that is all. If, however, the rye grass be allowed to go into flower, the field will be useless for next year's work. I have seen a farm of two hundred acres of rye grass, with one hundred and fifty quite useless for the purpose, because the managers had cut off the demand for grass by absurd arrangements, and as they could not sell it, they would not go to the expense of mowing, and allowed the whole crop of the ensuing year to be entirely lost by seeding. The local authorities

[1] See "*The Northwest Coast*," by James G. Swan, and "*Oregon*," by Gustavus Hines.

[2] A paper read before the Society of Arts by Alfred Carpenter, M. D., M. R. C. P., London, and published in the *Journal of the Society of Arts*. Continued from page 127, No. 585.

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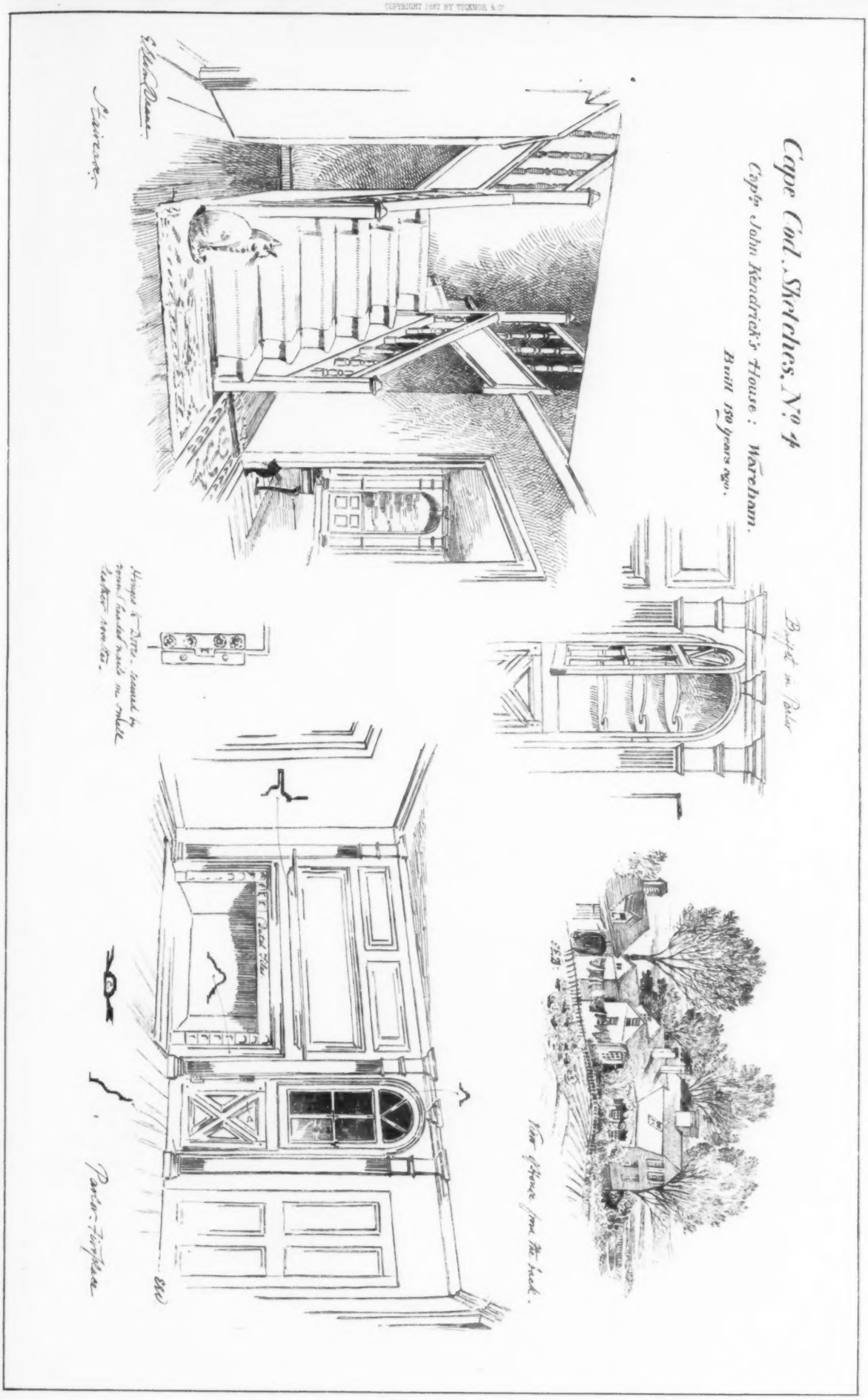


Heliotype Printing Co. Boston

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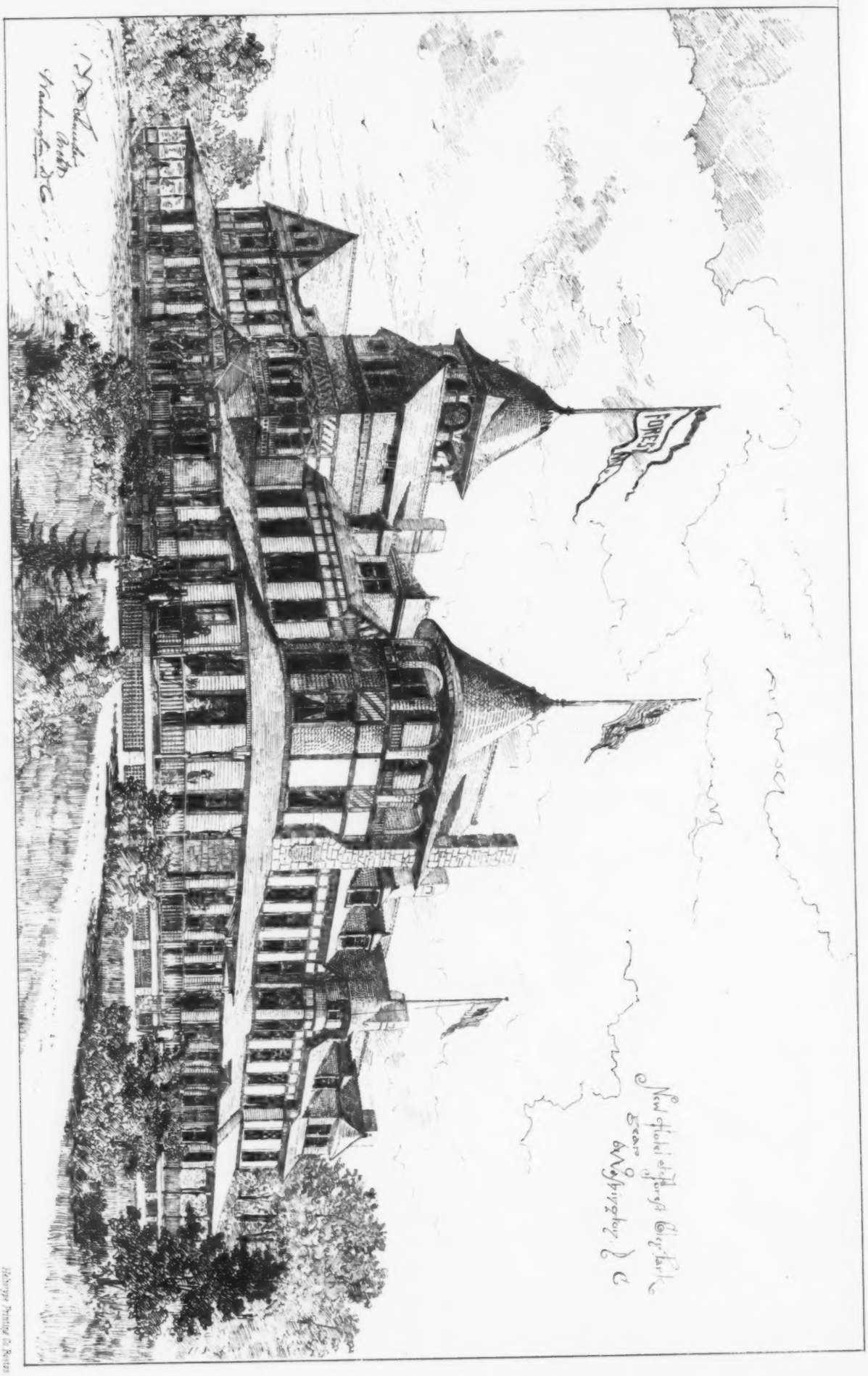


New Hotel at Forest Glen Park
near Washington D.C.

Heliotype Printing Co. Boston

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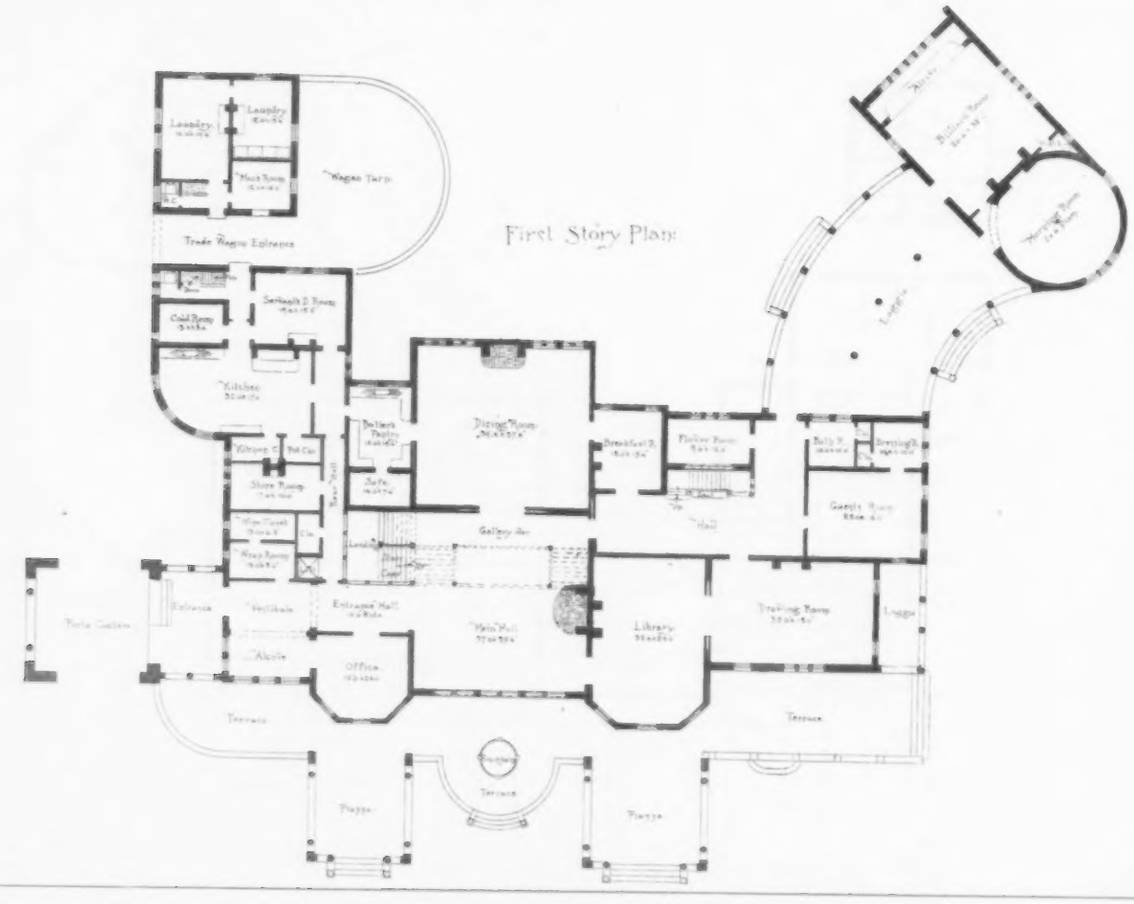
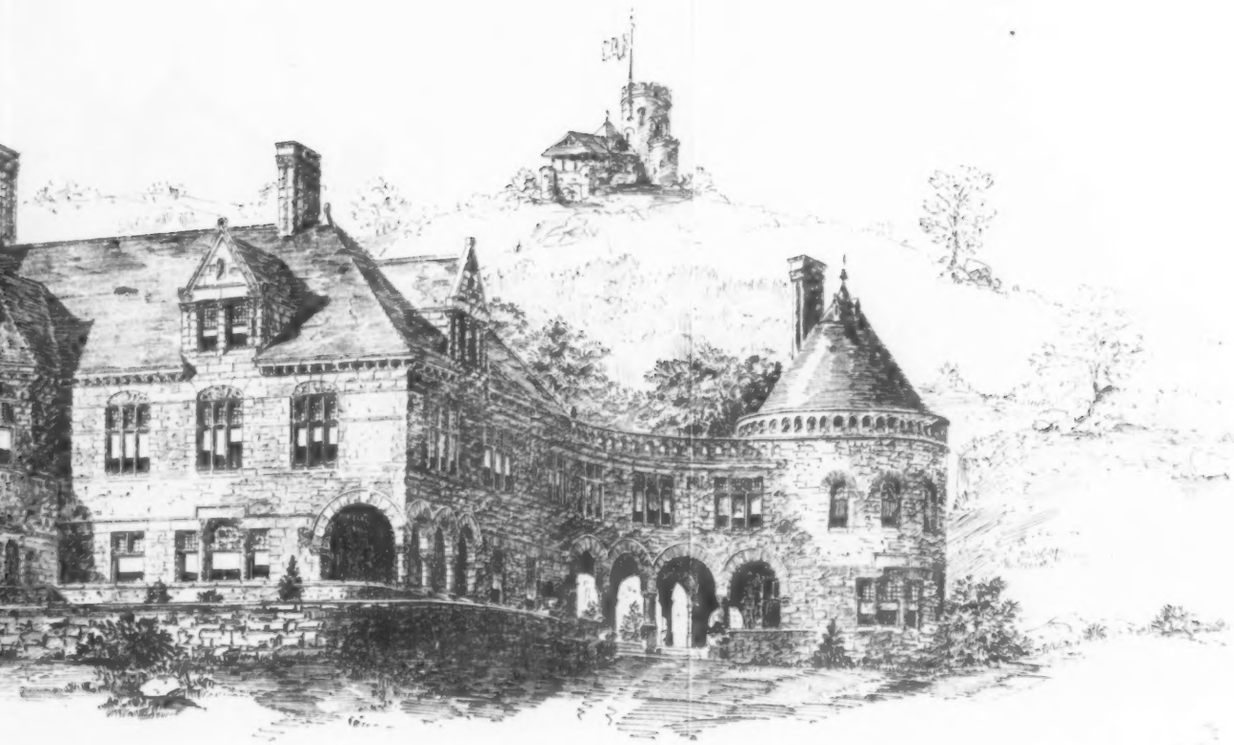
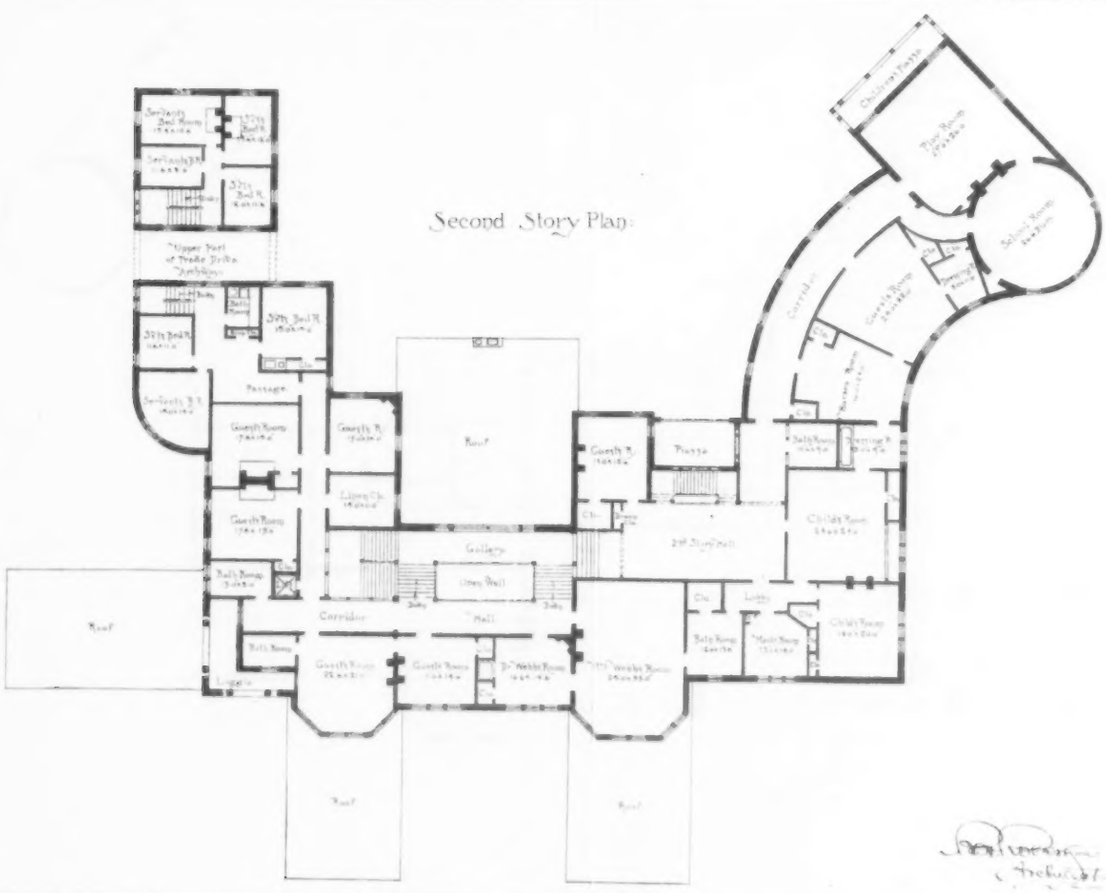

First Story Plan
Laundry
Wagon Turn
Trade Wagon Entrance
Servants' Dining Room
Cold Room
Kitchen
Pantry
Dining Room
Breakfast R.
Butler's Pantry
Safe
Store Room
Gallery
Hall
Entrance
Vestibule
Entrance Hall
Alcove
Office
Main Hall
Library
Drawing Room
Loggia
Terrace
Piazza
Billiard Room
Lodge
Guests' Room



Second Story Plan.



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# Proposed House at Flatbush, L.I.




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who were managing the farm at that time were also paying £10 per acre as rental for that land. It was no wonder that, with such management, the financial results were unsatisfactory, and the effluent not so pure as it ought to have been. Under the plans I have pointed out as the right principle to be adopted, I have known twelve tons of grass to be taken from a given area, and, within one month afterwards, a similar amount from the same plot, but this was when the season had been continuously warm. I should be fairly satisfied with an average of eight tons per cutting per acre.

Why do I prefer rye grass? Because it is a carniverous plant, digesting the animal matters presented to it, just as Darwin has described the action of the Drosera, or Sundew, upon the poor little fly which is caught in its embraces, or the action of the Amæba upon the organic remains which it may have surrounded in its outer membrane, turned for the occasion into a stomach. The plant acts at once upon the material without its being necessary for the organic matter to be reduced to lifeless salts before it is assimilated. I am bold enough to differ on this point with one of the greatest chemical authorities of our age, viz., Liebig. I do so because I watched, some years ago, with some interest, the action of various juices upon growing plants. I planted rye-grass seed in well-washed sand, and kept it under glass receivers, feeding one series of plants (after growth consequent upon pabulum in the seed itself, had ceased) with simple distilled waters, others with milk or beef-tea in weak solutions, others with fresh urine, others with stinking sewage, others with solutions of salts, which would represent the quantities of those materials contained in the various organic or animal juices that I used. Those fed with distilled waters remained all but stationary; those fed with fresh milk, fresh juices of meat, and other unchanged animal substances, grew much more rapidly than those fed with the nitrate of ammonia and phosphate salts. There was a marked difference between the sets of plants at the end of a week in favor of the *fresh* organic material, though in all other circumstances they were treated precisely the same. It appeared to me as if the carniverous plant was able to assimilate the animal juices much more immediately than the other matters, whilst those fed with stinking sewage did not grow at all in the time, any more than those fed with distilled water, and those treated by phosphates and artificial manures required more time to assimilate the material supplied to them, and at first grew more slowly. From the result of these experiments I am of opinion that it is not necessary for organic material to be reduced to its simple elements, and turned into ammonia and phosphatic salts before the plant can assimilate the material presented to it. It was apparent that if fermentative changes had begun, there was delay in assimilation; I account for that delay by the time required by the micro-organisms contained in putrefying sewage to complete the work of disintegration in which they are engaged. The process of assimilation was in that case slower than when the material was ready, as organized matter, to be absorbed and fixed in the tissues of the plant.

It is acknowledged that there is no known chemical difference between the albumen and the fibrine of vegetable matter as compared with that of animals. It appears to me that it would be a clumsy process if nature had to disintegrate matter into its original non-vital elements for the purpose of returning it to a similar organized state again; but I can understand that it is necessary, when the disintegrating process has begun in consequence of the activity of bacterial life, for that disintegration to be completed before the vegetable cell can deal with the matter presented to it. In fact, some of the plants fed with stinking sewage, in which putrefaction was not complete, did grow more rapidly than others, and I impute this to the probability that the plant fed upon the bacteria in the stuff, not on the salts. It is in the power of vegetable cell life to deal with fresh sewage in a more rapid manner than it can with that which is already putrefying, which is the keystone to success in sewage-farming. It is the principle which local authorities must attain to, if they wish for good financial results. When local authorities, therefore, complain of a decided loss upon sewage operations in a balance-sheet (excluding engineering difficulties), and whilst acknowledging the efficiency of irrigation in preventing river pollution, they are most likely allowing bacterial or fungoid life to destroy the fertilizing power contained in the sewage, and delivering it in stinking condition upon the land. But, as I have said before, these are no reasons for abandoning sewage-irrigation, because it has been repeatedly shown that the application of stinking sewage to land is not a part of the process to be entertained, and it is not a part of correct sanitary organization to allow sewers to exist in a town as sewers of deposit.

I think that osier beds, as a part of the cropping of a sewage-farm, are a mistake. Such beds may be planted in situations which cannot be kept properly dry, by reason of its being the bed of an old pond or an old water-course, or because it is invaded by effluent, but to lay out a farm with osier fields would be sanitarily a mistake. Osiers make good borders to sewage-fields, as belts around them, but they should only be used for protection, not for the absolute utilization of sewage, for it is impossible for them to produce the weight of crop required. So also with ordinary grass or meadow land. It is very well to have meadows capable of being sewaged when there is excess of storm waters, or when the effluent, having been applied to a newly-prepared plot, is not so clear as could be wished. It is then prudent to pass it over a meadow before it is sent away from the farm. These meadows should also be at the lower part of the farm, and the farthest away from the first delivery of sewage, so that crude sewage does not reach them. If fields are continuously sewaged, the ordinary meadow grass is destroyed, and water grasses only develop, which are not nearly so useful as rye grass, and when so used, the plot lessens the power of the farm to deal with the purification of the water and the utilization of the sewage itself. Osier beds and water meadows should be only adjuncts to a sewage-farm, unless the area is unlimited.

The possibility of the production of the liver fluke (*Distoma hepaticum*) in sheep, a disease causing great fatality, is used as an objection to sewage-farming by Dr. Tidy.

There are times in the year, such as the early spring, when feed is exceedingly plentiful on the farm, and the season dry, when it may be allowable to put a flock of sheep for a week or two upon the fields which have not been recently sewaged, and which it is proposed to break up in the middle of the year; but a manager who habitually feeds sheep upon a sewage-farm is doing that which no sensible farmer would be likely to do — put sheep upon wet meadow land. Those who understood sheep-farming only choose dry and open areas for the growth of mutton, with fine short grass, not the free-growing plants which flourish on irrigated meadows. The possibility is no danger to irrigation. If sheep-feeding is adopted, it shows that the manager does not understand his business.

I have said that it is the best plan to take a crop of roots from the land when the rye grass is broken up. The process of breaking up the land is an important one, and must not be delayed beyond the end of the third year. If the crop of grass seems in the third year to be failing, the land should be broken up in the middle of the year, or early in the autumn, and a crop of cabbages (or collards) taken off, leaving the ground ready for mangolds in the following spring. The land must not be sewaged in the same manner as when rye grass was growing upon it. The cabbage and mangold plants will take the sewage very well whilst they are young, and occasionally, as they approach maturity, it will be useful if the weather be dry; but the soil is not to be dressed so frequently as was the case with rye grass, although the arable land, whilst fallow, before the plants have been put in, or whilst they are very young, will bear frequent dressings of sewage, and the soil will fix a considerable amount of fertilizing matter in its humus, and hold it, if the weather be cold, until it is wanted. It will be retained until the roots of the growing plants extract it from the embraces of the soil. I cannot agree with Mr. Bailey Denton as to the superiority of roots over rye grass. Roots should only be used to assist in exhausting the soil of the materials which the rye grass had not taken out.

Cereals are not to be encouraged upon a sewage-farm oftener than once in from six to ten years. The sowing must be dependent, to some extent, upon the season. If the mangolds have been clamped early, so that the ground can be prepared for a crop of wheat, that cereal may be sown if season will allow. I have had some of the finest wheat from the Beddington farm that has ever been produced. We had six to seven quarters to the acre; some of it, grown twelve years ago, is on the table, and I think that will speak for itself; but no sewage must be applied after the sowing is completed, for this reason: cereals cripple a narrow area. If the wheat is not sown until the spring, it allows of the use of the fields for frequent dressings in the winter seasons. As a rule, oats are preferable to wheat, as there is abundance of straw, and excellent crops of oats are obtainable which may be used on the farm. The straw works up well as forage for the cattle in the winter time, and it is advantageous on heavy land to dress it with long manure for cereal crops, as the decay of the straw allows of the subsoil being made more porous. I am almost afraid to give a little hearsay evidence as to the growth of rhubarb at Aldershot. I know that we had immense crops from four acres at Beddington, and had no difficulty of disposing of the produce. We did not continue it, not because of the flavor — which had only a "sewage twang" in the imagination of Dr. Tidy's informant — but because it did not utilize the quantity of sewage which the land had to deal with, for it could not be and was not sewaged whilst the crop was being perfected and collected. Rhubarb is somewhat out of place in a sewage-farm. I was told that the Aldershot rhubarb, of which there were eleven acres at the Camp farm, made a champagne of the finest brand, at a cost of about 1*s.* a bottle. I do not advocate market-gardening of any kind, though I have seen all kinds of fruit and vegetables grown in the greatest perfection. Strawberries and raspberries, which would have been a credit to any table, and with unsurpassed flavor, whilst the smell of violets, onions, sage and other plants with strong odors were so manifest that any one walking with his eyes shut could tell the kind of crop by the odors of the crop as he passed along the gardens in which the sewage was actually being used at the time of the visit. Whatever odors the sewage might have caused, they were utterly unable to overcome the natural smell of the spring violets in Mr. Stedman's fields whilst he was taking sewage from the Beddington Farm, and the odor of his strawberries were well known and appreciated in the London markets, where he had no difficulty in disposing of his very satisfactory crop. But market-gardening does not answer for sewage-farms, because the area cannot take the sewage which has to be utilized, and when the market-gardener wanted the sewage most, the sewage-farmer could not spare it. The result was a difficulty between the two which led the managers to discontinue the supply to Mr. Stedman's market-garden. We also discontinued market-gardening for other reasons. The sewage had to be utilized, and the

area was too contracted to allow of so much being out of use at the very time when the largest area was required to deal with the Croydon sewage. I give these facts as reasons why sewage-farmers should not engage in market-gardening unless they have a very extensive area of land to deal with. Voelcker condemned market-gardening on sewage-farms for these reasons, and not because "sewage clogs the soil."

Let us now pass to the value of the crops upon farms irrigated with sewage. Dr. Tidy says that sewage produce is best described "as dropsical." He says, "it is difficult to dry, and prone to decompose," and quotes Voelcker as stating that it does not yield so nutritious a product as natural pasture. "If," he says, "you want good produce, you must be content with small quantity." This is an argument which may be as fairly applied to the produce which nature supplies to all regions in which there is a heavy rainfall, to the Valley of the Nile, for instance, as to sewage-farms. Dr. Tidy gives a table containing the percentage composition of dry substances obtained from plots, one of which was not sewaged, and the other three sewaged from 1,000 to 9,000 tons per acre. The same argument has been advanced by other objectors, and I have exposed its fallacy over and over again.

The principal deficiency, as shown in Dr. Tidy's table, is in non-nitrogenous matters; it is very slightly deficient in woody matter, whilst there is an increase in the mineral, fatty and nitrogenous constituents. Dr. Tidy's error is in taking a sample and analyzing that, without reference to the quantity produced from the area treated. Multiply the sample analyzed by four — for that will be about the difference in the weight of the produce — and you will get very different results, the total quantity of sugar produced being very much larger than was the case from his unsewaged meadow. Notwithstanding this sugar, the fattening power of sewage-grass is depreciated by Dr. Tidy. If he means that it will not produce the unwieldy and unhealthy cattle that one sees at the Christmas cattle show, I quite agree with him. I do not think that the production of such cattle is to be encouraged; but I do know that bullocks grown upon a sewage-farm do give a meat which is free from the loathsome quantity of fat which other food will produce, and which appears to me only to benefit the cook and the rag-and-bone shop at which she sells the produce of her dripping-pan, to the injury of her master and the increase of his butcher's bill. The meat from sewage-fed cattle is not loaded with fat, but it is solid, substantial meat, of good flavor, and does not waste nearly so much in the cook's hands as fat meat usually does. I have repeatedly tried it, and I know that it is very digestible and satisfactory as a diet, and so the guests have found who have fed upon sewage-grown beef, at my own house and at Beddington.

The experiments adduced by Dr. Tidy with milch cows do not exactly correspond with other evidence. He acknowledges that the chemical analysis of the milk from cows fed on sewaged or unsewaged grass does not indicate any material difference. I thank him for this addition, as it renders it unnecessary for me to republish in detail the analysis, made by a very eminent chemist, of milk taken from fifteen sewage-fed cows, and which was published in *Bell's Weekly Messenger* five years ago. Those analyses were made of milk taken by the analyst's agent, without notice of his proposed presence at the farm. He came to me without notice, and I took him, with his bottles to Beddington, he saw the cows milked, and he took the milk away with him, not a single person being aware of the possibility of his advent until he appeared. I am justified in republishing the average of the whole number, which will show how highly satisfactory the result was to the managers of the farm, and to the produce of cows fed entirely upon Italian rye grass. Wanklyn gives, as his average, for the guidance of analysts:

| | |
|---|---|
| Solids, not fat | 9.3 |
| Fat | 3.2 |
| Water | 87.5 |

The average of those fifteen cows to which I have referred is:

| | | |
|---|---|---|
| Specific gravity | | 1030.05 |
| Percentage of cream | | 15.5 |
| Solids | Not fat 9.26 | 14.21 |
| | Fat 4.96 | |
| Ash | | .64 |
| Chlorine | | .065 |

There was one cow only in the whole list which was comparatively low, the reason for which was not apparent, otherwise the average would have been higher. We were unable to identify the particular cow, so did not discover the reason for the deficiency of cream which certainly existed in the milk from that one cow. The cows milked were the whole of the animals in one of the sheds, and in no way differed from the sixty which at that time were fed upon the farm.

I have to apologize to the members of this Society, and also to Dr. Tidy, for so often referring to his paper, but as that is the *raison d'être* of my presence here to-night, I must continue to follow him. His next description is that of surface-irrigation. He does not think that the sanitary aspect of the question is in accord with the agricultural. Again he has misunderstood the whole subject. If there is not a sanitary success, it is quite impossible for there to be a financial one. They are linked together in one way, though it is possible to be a sanitary success, although not necessarily so financially; but the *vice versâ* cannot arise. Dr. Tidy has taken the evidence afforded by persons who knew nothing of sewage-farming, as evidence against the plan; when he asserts that the sewage of two persons applied to an area of land can, in any way, be considered as of any use in settling the question, he shows the weakness of the evidence he adduces. That afforded by the Earl of Essex is much more to the point. I have no doubt that a well-laid-out field will take and deal with from 5,000 to 10,000 tons of ordinary town-sewage per annum, according to its retentive or non-retentive character, provided the quantity of material taken off corresponds with that which has been put on, viz., at least forty tons of produce for each 5,000 tons of fresh town-sewage; this will be the sewage of from 100 to 200 persons per acre. Dr. Tidy, says however, that a minimum of 100 equalling an application of about 4,000 tons of sewage is necessary to pay, whilst thirty is the maximum to escape prosecution. I am unable to find a single instance in which such a prosecution has taken place, as will be seen in the report annexed, though immediately before he states, upon the evidence of Professor Robinson, that in nineteen towns in which irrigation is practised the average number of persons provided is for 1.37 per acre. All these nineteen ought to have a prosecution carried out to a successful issue if there is any foundation for Dr. Tidy's opinion, viz., that the sewage of thirty persons to the acre will be the maximum capable of being utilized if the town is to escape prosecution.

In the years 1876 and 1877, this Society published a *resumé* of returns from thirty-seven different towns in the kingdom, then utilizing their sewage by irrigation; I give the results, as far as I have been able to get them, of the practice still followed in those towns. If Dr. Tidy's statement is correct, we shall have evidence of successful prosecution and arrest of process. I, however, do not find a single case which supports the view he so forcibly expressed in his paper upon this point, and I am at a loss to know upon what grounds he submitted it to this Society.

I cannot pass by intermittent downward filtration without further comment, though I have already stated my own views regarding it. The process is one qualified to provide against river pollution by oxidizing the organic material in sewage, and rendering it safe for transmission by river-carriage. It is to some extent a necessary adjunct to a sewage-farm, which has to deal with immense quantities of sewage, on a small area, or which cannot be easily subdivided, especially if the rainfall is also to be dealt with to any extent. The areas provided by Mr. Bailey Denton, act as filters for the time being, they must be continuously aërated, and the surface frequently broken up so as to allow the filtration to go on. But I prefer an area sufficient for vegetable life to deal with the organic material rather than to turn it into nitrates and nitrites which is the main result of intermittent downward filtration. Every farm should have a portion of its area at the lower part of it capable of being utilized for this purpose, just as every railway must have a break-down gang, should such be required by emergency or accident. It is, however, as an adjunct, not as of first application. For short periods, and at intervals of time, one acre will be enabled to deal with the sewage of 3,000 people on the principles recommended by Mr. Bailey Denton. I agree with Dr. Tidy "in the advantages of intervals of rest alternating with intervals of work," but this is my idea of the work of broad irrigation. In the one case we get the growth of produce which gives wealth for the country, and food for the people, in the other we reduce sewage to its simple elements, and send them away to the sea. The objections which are made against the principle of broad irrigation are such as efficient management, by frequently disturbing the surface of the soil, can always efficiently overcome. Dr. Tidy says, "intermittent downward filtration" had its birthplace in the laboratory; he might have said in the filters of our great water companies. He says also, "no laboratory experiment, pure and simple, can teach sewage treatment." I am again in accord with him, as I am glad to be when I can.

[To be continued.]

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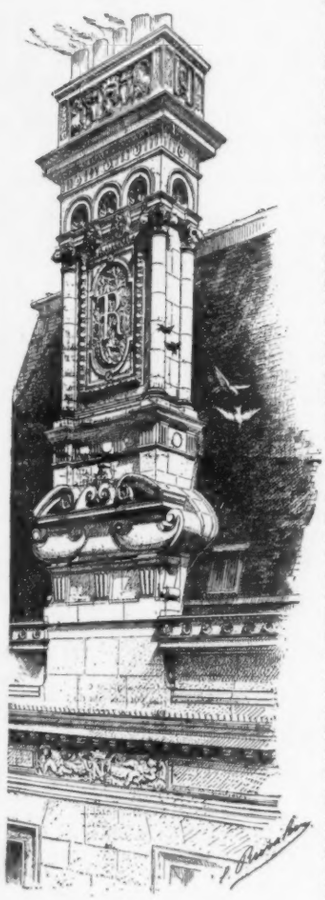
The Blue Grotto at Capri. — An item which has been going the rounds recently in regard to the famous blue grotto somewhat misrepresented the intentions of the American gentleman who owns the land above it. The following is supposed to be a correct version of the affair: A lawsuit is in progress concerning the famous Grotta Azzurra at Capri. An American, Mr. John Mackowen, has become the owner of the soil immediately above the grotto. But the village of Capri, in its corporate capacity, has hitherto regarded itself as the owner of the grotto, and as such has levied a small fee from all visitors to the grotto. Mr. Mackowen proposed to sink an underground way from the villa above to the grotto. The village authorities object, both because of their reputed ownership, and because the letting-in of ordinary daylight would put an end to the singular appearance now presented by the place. The American undertakes to construct his passage so that no light from above can penetrate below, and promises to put a gate which shall exclude intruders, as well as daylight. The boatmen who now make an income by conveying passengers to the spot (at present the only mode of getting admission to the grotto) object vigorously to the inroad on their vested interests. It is worth recalling that when the Emperor Tiberius appropriated Capræ for his solitary retreat he had a passage constructed which led down to the grotto, which he used as a bath. This passage is still in existence, but impassible, being choked up with rubbish. — *Exchange.*

## THE PROPOSED EIFFEL TOWER.



AN appeal has been addressed to M. Alphand, the Chief Director of Works of the City of Paris, against the colossal iron tower, which is to be erected at the entrance to the Exhibition of 1889. It is signed by many artists and writers, and is to the following effect:

"We come, writers, painters, sculptors, architects, passionate lovers of the hitherto intact beauty of Paris, and protest with all our might and all our indignation in the name of disregarded French taste, and menaced French art and history, against the erection in the very heart of our capital of the useless and monstrous Eiffel tower, which public sarcasm, so often marked by common sense and a spirit of justice, has already christened 'Tower of Babel.' Without falling into the fanaticism of Chauvinism, we have a right to proclaim aloud that Paris is a city without a rival in the world. Above its streets and its widened boulevards, along its admirable quays, amid its splendid promenades, rise the noblest monuments to which human genius has given birth. The soul of France, a creator of masterpieces, gleams amid this august inflorescence of stone. Italy, Germany, Flanders, so justly proud of their artistic heritage, possess nothing which can vie with our own, and from every corner of the universe Paris attracts curiosity and admiration.

"Are we about to let all this be profaned? Is the city of Paris about to associate itself with the grotesque and mercantile imagination of a machine-maker, irreparably to disfigure and dishonor itself? For the Eiffel tower, which even commercial America refuses, is, rest assured, a dishonor to Paris. Everybody feels it, everybody says it, everybody is deeply grieved; and we are only a feeble echo of the universal opinion, so legitimately alarmed.

"Lastly, when foreigners come and visit our Exhibition they will exclaim with astonishment, 'What! is this hideous thing what the French have devised in order to give us an idea of their vaunted taste?' And they will be right in ridiculing us, for the Paris of sublime Gothics, the Paris of Jean Goujon, of Germain Pilon, of Puget, Rude, Barye, and others, will have become the Paris of M. Eiffel. It is enough to consider what we put forward. Imagine for a moment a dizzily ridiculous tower, overlooking Paris like a gigantic black factory chimney, overpowering with its barbarous mass Notre Dame, La Sainte Chapelle, the tower of St. Jacques, the Louvre, the Invalides Dome, and the Arc de Triomphe — all our monuments humiliated, all our architecture dwarfed, and fated to disappear in this stupefying dream. For twenty years we shall see tapering like a spot of ink over the entire city, still thrilling with the genius of so many centuries, the hateful shadow of the hateful column of bolted sheet-iron."

Among the signatories are the following: MM. Meissonier, Robert Fleury, Gérôme, Bonnat, Jean Gigoux, Boulanger, Ch. Garnier, Sardou, Bouguereau, Pailleron, Guillaume, Elle Delaunay, Alexandre Dumas, Coppée, Gounod, Sully-Prudhomme, Jules Lefebvre, Daumette, Français, Thomas, Bertrand, François Lenepveu, Questel, Leconte de Lisle, Lenoir, Henriquel, Goubie, Duez, Maupassant, Jacquet, Courtois, Dagnan Bouveret, Saint-Marceaux, Antonin Mercié, etc.

M. Lockroy, the Minister of Commerce, who has control of the Exhibition, has also addressed M. Alphand, but in a less grave manner than characterizes official utterances in this country, as will be seen from the following:

"From the dignity of the periods, the beauty of the metaphors, the Atticism, and the delicate and precise style, one can guess without even looking at the signatures that the protest is due to the joint labors of the most celebrated writers and poets of our time. This protest is very severe as regards you, M. le Directeur des Travaux, and no less severe as regards me.

"'Paris, throbbing still with the genius of so many centuries,' it says, 'a noble inflorescence of stone, amid which gleams the soul of France, would be dishonored if a tower were erected which trading America refused. . . . This barbarous mass,' it adds, in its lively and highly-colored language, would spoil the 'Paris of sublime Gothics, the Paris of Goujon, Pilon, Barye and Rude.'

"The last passage will strike you doubtless as much as it struck me, for French art and history, to use the words of the protest, had not taught me that Pilon, Barye and Rude were sublime Gothics. But when competent artists state a fact of this kind, all we can do is to bow in acquiescence. If, however, you desire instruction on this point you may obtain it from M. Charles Garnier, whose indignation must have refreshed his memory. I appointed him three weeks ago consulting architect to the Exhibition. Do not allow yourselves to be influenced by the form, which is fine, but look at the facts. The protest is inappropriate. You will point out to those signing it, who will bring it to you, that the construction of the tower was decided upon a year ago, and that the building-yard has been open for a month. The protest should have been made in proper time. This was not done, and this virtuous indignation has the fault of bursting forth too late.

"I am deeply grieved on this account. It is not because I have any fear for Paris. Notre Dame will remain Notre Dame, the Arc de Triomphe will remain the Arc de Triomphe; but I might have been able to save the only part of the great city which was seriously menaced — that incomparable square field of sand called the Champ de Mars, so worthy of inspiring poet and bewitching landscape painter. You may express this regret to these gentlemen. Do not tell them that it is painful to see the Exhibition attacked beforehand by those who should be its defenders; that a protest signed by such illustrious names will make a stir throughout Europe, and will have a chance of furnishing a pretext to certain foreigners for not taking part in our *fêtes;* that they are ill-advised to seek to ridicule a pacific work to which France clings with all the more ardor because at present she is unjustly attacked abroad. Such paltry considerations influence a Minister. They will have no weight with those lofty spirits who are preoccupied above all with the interests of art and the love of the beautiful. What I beg you to do is to receive the protest and to take care of it. It ought to be on view in a case at the Exhibition. Such a beautiful and noble piece of prose, signed by names known throughout the world, could not fail to attract the crowd and perhaps to surprise it."

M. Eiffel has received a visit from a Parisian "interviewer," to whom he discoursed in the following manner:

"They begin by declaring," he remarked, referring to his adversaries, "that my tower is not French. It is big enough and clumsy enough for the English or Americans, but it is not our style, they say. We are occupied more with little artistic *bibelots* than giants of bad taste like your tower. But though we are occupied most with art and music, that is no reason," said he, emphatically, "why we should not show the world what we can do in the way of great engineering projects. And as for its being bad taste, why, on the contrary, it will be one of the chief ornaments of the town. One of the most frequent objections made to the tower is that it is useless. That is another error. Take its importance, for instance, from a meteorological point of view. It is not every day that meteorologists can get up a thousand feet above the soil. This tower will enable them to study the decrease of temperature at different heights, to observe the variations of winds, find out the quantity of rain that falls at different heights and the density of the clouds. Indeed, in all that relates to temperature, hygrometry, air-currents, and the composition of the air, the tower will afford opportunities for study and research, many of which have hitherto been impossible. It will be equally useful to astronomers. Here experiments with the spectroscope can be carried on with great facility; the laws of refraction and the physical aspect of the moon, planets, and nebula studied in most favorable conditions. I have received testimonies from *savants* on all these points. Then there is its utility from a military point of view. In the event of another siege of Paris, see how important this tower would be. Communications could be kept up by means of optic telegraphy for a great distance around Paris; for from the summit you have a magnificent panorama extending from 129 to 130 kilometres. Paris by night, decorated and illuminated as it will be during the Exhibition, is a sight which before was only within the reach of aëronauts. In fact, the tower will be the chief attraction of the Exhibition. Sir Cunliffe Owen remarked to me just the other day, 'Do you think that we English will come to look at your little *bibelots* and pots of pomade; no; but we will come in hundreds to see your tower.'

"There is besides an attraction in the colossal, a special charm, to which the ordinary theories of art are not applicable. Will it be maintained that it is by their artistic value that the Pyramids have so much impressed the imagination of men? After all, what are they but artificial hillocks, and yet who sees them and remains unimpressed in their presence? Who has returned from them not filled with an irresistible admiration? And what is the source of that admiration, if it be not found in the immensity of the effort and the grandeur of the result? My tower will be the highest erection ever raised by men. Will it not also be grandest after its fashion? and why should what is admirable in Egypt become hideous and ridiculous in Paris? I seek a reply, and confess I find none."

"What if it topple over, M. Eiffel?" "There is not the least

danger of that. In our construction of the tower we have calculated on the force of the wind. We have calculated that the tower will normally withstand a wind-pressure of 300 kilogrammes per square metre, which amounts to a total pressure of 2,250,000 kilogrammes. We have made this calculation on the most favorable hypothesis possible. We have reckoned the trellis-work as full walls, and made other allowances. And, as the strongest tempests known in Paris have never been beyond a pressure of 150 kilos per square metre, the tower is perfectly secure. Should a wind bearing a force of 300 kilos arise, little would be left standing in Paris except the tower." — *The Architect.*

## THE PRESERVATION OF BUILDING STONE.[1]

THE methods for the preservation of stone are, first, properly inclined surfaces that will shed the water so that it cannot stand on the surface; properly undercut mouldings, so that the water cannot creep up under and remain so long as to dissolve out the binding material; keeping out the water as far as practicable. This must be done by water-proofing, so to speak, the foundations; placing a thin layer of asphalt between the foundation stones and the vertical walls of the building proper, two or three feet above the ground. This would prevent the slightly acid waters from the earth rising and decomposing the lower tiers of stones. Asphalting the fronts of the foundation walls themselves, previous to throwing the earth back against them, would prevent the entrance of a considerable amount of water, so that if the face of the foundation next the soil and its top were asphalted, the water would not enter here.

If the stone has been already acted on, and is to be preserved, something must be added to the outside to fill up the pores formed by the solution of the binding material, and prevent further encroachment of the water containing the acid gases in solution. To heat the surface of the stone, already weakened by decay, is only to make the decomposed surface more liable to flake. It must, therefore, be applied to the cold stone. Anything that forms a gum that is impervious to water, and can be made sufficiently liquid to penetrate the pores and pittings of the stone, will answer the purpose. Bees-wax or rosin dissolved in any of their solvents, with or without oil, have been used. Boiled linseed oil, which forms a gum, does very well, and only slightly discolors the stone for a time. But all of these substances decompose after a few years, and must be renewed. Paraffine dissolved in boiled oil, and put on hot, answers better, as it is more effectual, and after one or two applications will fill the pores completely. But no substance applied after decay has begun is equal to a preventive, and no preventive can preserve flat surfaces and projecting mouldings which are not undercut, from decay. Water-glass associated with a bituminous substance, a preparation known as Szerelmy's compound, was used on some of the interior courts of the Houses of Parliament some years ago. I inspected all of these courts in the summer of 1884. The dilapidated condition not only of the finials, but even of the flat surfaces of the stone, showed that it had not even been a palliative.

About the year 1868, the Vielle Montagne Co., of Liege, introduced the process of painting with water-glass and oxide of zinc. This was applied to the railroad station at Liege, and to parts of the Houses of Parliament. A silicate of zinc and lime is thus formed on the outside of the stone, which indurates it superficially. The want of penetration, or careless application of the material, makes the surface flake, and it, like all other paints, requires frequent repetition.

Ransome's process, which consists of using water-glass, with a subsequent application of some chloride, answers very well, but is a very expensive process, as it requires that the stone should be entirely re-faced, in order to clean it. This, and the number of applications of the silicate, and subsequent application of the chloride, consumes so much time, and is so expensive, that it cannot come into general use. It has been applied satisfactorily to some small parts of the Houses of Parliament, but has been discontinued on account of its very great cost. The same is true of a number of other processes, which require, first, the cleaning of the stone, and the subsequent application of several chemical substances, such, for instance, as the process of the Silicate Paint Company. They are excellent in themselves; they can be put on with certainty, when used with great care, and over small surfaces; but when they are to be applied to buildings already constructed, they either fail from the impossibility of applying them evenly on large surfaces, or become entirely impracticable on account of the expense. The principle of most of these processes is correct, and it is to be hoped that some corporation will find it to their advantage to have investigations made that will lead to the discovery of some substance which is both cheap and of easy application. Such substances undoubtedly exist, but they require to be sought for. Any process which requires the formation of a chemical union between the stone and the substance applied, must be put on in such a way as both to be certain of its penetration, so that the action will not be superficial, and to insure that the compound formed will not only become sufficiently indurated to withstand the weather, but sufficiently compact not only to resist the penetration of gas, but also to prevent the absorption of moisture, and to shed it at once from its surface. Very few natural stones even do this, and they are the very compact silicious stones, or dense carbonates, which are very homogeneous.

When oils, with or without paraffine and sulphur, are used for waterproofing stone, they should always be applied while hot, as they are then much more liquid, and, consequently, more effectual. It is better, also, that the application should be made when the stone is also warmed by the heat of the sun — that is, either in the spring, summer or fall, rather than in the winter. This application of oil, however, is not permanent in its effects. The oil forms a gum in the pores of the stone, filling them up temporarily, so that the water does not enter, but after a time this decomposes, and must be replaced. It is very easy to distinguish the surfaces of stone that have been treated with oil, by observing them immediately after a shower, when it will be seen that the stone becomes dry much more rapidly than that which has had no such application. The necessity of applying the oil once in every two or three years is one reason why it is so little used. When paint is used, the solid material with the oil is of no account whatever. It remains on the outside, and does not enter the pores of the stone, and when the gum is decomposed it is washed off the surface. Another objection to painting the stone is that, while adding considerably to the expense of the process for protecting the stone, it adds nothing whatever to the efficiency of the oil, and it is very apt to fill up the fine tracery that may be upon the surface of the stone. It is, therefore, entirely unnecessary, and in some cases may be injurious, as preventing the penetration of the material which is designed to waterproof the stone. When oil is heated with an excess of sulphur, it dissolves about thirteen per cent of it. More of it will dissolve in hot oil, but the sulphur crystallizes out upon cooling, and when there is a large excess of it, a partial decomposition takes place, and sulphuretted hydrogen is formed. The oil, with the proper amount of sulphur, becomes thick and dark like molasses, but when heated is quite thin. When the stone is coated with this material, it penetrates below the surface, and as the sulphur is simply in solution, when the gum of the oil decomposes it leaves the sulphur still in the pores. Two or three applications of such a material as this would prevent any further decomposition. It has been found by experiments made on the Houses of Parliament that sulphur applied in some such way has been the only thing that has arrested decomposition in that soft, porous stone; but even this preparation has not prevented the flaking of the surface of the stone after an exposure of about twenty years, probably because it was not applied hot, and was put on when the stone was moist, or when the weather was cold.

If twenty per cent of paraffine be added to oil containing the sulphur in solution, it thickens when cold into a semi-solid buttery mass, but is fluid when hot. Such a preparation as this, applied hot to the stone, gives another element with the sulphur, which does not decompose, to fill the pores of the stone. There may be cases in which it is undesirable and inconvenient to use sulphur, and in these cases twenty per cent of paraffine mixed with hot oil may be used. The same is true of this as of the other preparations mentioned. The paraffine, which is, like the sulphur, practically indestructible, remains in the pores of the stone after the decomposition of the organic matter of the oil has taken place, and one or two coatings of such material as this will waterproof the stone entirely and prevent further disintegration. Other preparations of paraffine may be used to advantage, but those which involve heating the surface of the stone should be avoided. It has been suggested that these preparations discolor the stone. It is true that the color of the stone is darkened by them, but the stone is not disfigured, as the color given is very nearly uniform over the whole surface. In some cases the stones, after the application of the oil, have been washed with ammonia salts to take off the excess of the material from the surface. It is generally, however, undesirable to do anything to the stone after the liquid has been applied, as the surface will very soon become bleached by the action of the weather.

It has been objected to the use of oils that they would interfere with the adhesion of the mortar in the stone, if the stone were treated before it was put into the building. In actual practice, however, this does not seem to be the case. The stone is not only more thoroughly protected from moisture upon all sides — for in stone buildings in damp countries the moisture is as much to be feared on the inside as on the outside — but it does not seem in any way to deleteriously affect the binding power of the mortar. It acts advantageously both on the stone and the mortar, and does not influence any of the chemical changes that take place, either by accelerating, retarding or preventing them. This fact was well known to the ancients, for they used oil in mortars and cements to a considerable extent. When it is desirable to use soft and very porous stones for building purposes, the stone should be dipped either into boiling oil or some such preparation as this, before being put into the building, so that its entire surface may be coated. The experience of the last thirty years shows that the stone cannot be perfectly protected unless this is done on all sides of the stone. Such coating does not in any

[1] Extract from a paper by Thomas Egleston, Ph. D., read before the American Society of Civil Engineers, and published in the *Transactions* of the Society.

way prevent the adhesion of the mortar, if done either before or after it is put into the building.

In the experiments made in the year 1861, I was successful in preventing the further decay of a building which has, up to this time, shown no sign of lamination or disintegration. This was done by the use of thoroughly boiled oil alone, applied with a brush during the warmest of our summer weather, when the stone was very hot. It was done twice, at intervals of several years, and completely arrested the decay for the time being. It would have been much more effectual if the preparations mentioned above had been used. The application of such material does not change the surface of the stone. It was used almost exclusively on porous sandstones. It seems to form a sort of cement, similar to the organic binding material which is so common in many of the brown sandstones, but with the limestones this has not been found useful to any extent. It requires renewal so often, and changes the color of the stone so unpleasantly, that it has not been found of service with these stones. Such preparations are, however, of no use on stones of whatever character, where the decay has been produced by disintegration caused by the unequal expansion and contraction of the minerals forming the stone. Such disintegration is very slow in most stones. It has taken thousands of years to produce it in the granites of the obelisks of hot countries. It appears to be more rapid in cold ones, but it takes place with unerring certainty and regularity in all those rocks where the minerals composing them have different rates of expansion and contraction. Here, as in the other case, there are cavities, but the filling of them does not arrest the decay, because it does not attack the cause. Nothing will arrest such decay, and no other decay in stone, except those caused by the air and water, can be prevented by any application to its outside. It is therefore useless to attempt the preservation of such rocks as granite, since the unequal expansion of the minerals which compose the rock cannot be arrested by filling the cracks. They are applicable only to stones from which something has been dissolved out, leaving cavities which can be filled from the outside. Waterproofing the surface of a stone has the effect of keeping the water out of pores that allow some of the constituents of the stone to be attacked, and is effectual in those stones only which are either porous by nature, or have become so by the solution of parts of their ingredients; but it has absolutely no effect where there is any movement in the particles which compose the stone, however this movement may be produced.

No method of protecting the surface of the stone of the Houses of Parliament has, so far, been successful, except where sulphur was dissolved and added to the outside of the stone, and this rendered the stone for a very long time waterproof. It had remained so for twenty years up to August, 1884, when I examined it and found that it had begun to laminate, the part of the stone containing the sulphur peeling off in thin scales. The experience of the repairs at the House of Commons is that most of the substances which are supposed to be useful are absolutely useless, if not positively harmful to that stone; that almost the only one that has been successful at all on these stones has been sulphur dissolved in some compound, and applied to the stone so that the sulphur itself was precipitated in its pores. But even this does not seem to have entered very far, and has not been successful unless the stones put in place of those removed had been treated on all their six sides. In that case the stone has been preserved, but how long it will remain so it is impossible to tell.

With dolomite, in which there is a large excess of lime, the only safety is to prevent the action of the carbonic acid contained in the air by waterproofing the outside of the stone. This can be less successfully accomplished, because, as the surfaces of attack are comparatively large, the action is from the outside, and but little pitting takes place, as the interlacing of the crystals makes cavities that never can penetrate far into the stone. Any coating applied to the outside will therefore be likely to wear off after a time, and thus leave fresh surfaces of attack, which do not at once become visible, as the surface is constantly kept clean by the rain and the wind.

All the experiments made in Europe with the use of silicate of soda, or water-glass, upon any building stones, except those in which lime and magnesia were principal elements, have met with signal failure. The use of water-glass or siliceous material amounts to nothing on siliceous rocks. The silica becomes decomposed by exposure to the air, and forms a sand which drops off, and the caustic alkali is washed out or remains behind to help the disintegration. The only things which have been successful have been those that prevented the attack of the acid gases or water from the surface or sides of the stone.

Waterproofing is best done by a compound of paraffine, sulphur and oil, applied to the stones before they are put into the building, or else frequently applied to the surface after they are put in. In sandstones the sulphur is not necessary. Oil, with a certain amount of paraffine, may be used, providing the application is made hot. If, however, it is made cold, the preserving material sinks but a little way into the stone. If the stone is heated from the outside, with the intent to bring the surface of the stone up to such a point that it will heat the paraffine, there is great danger that the stone will suffer more from the remedy than from the disease.

There is no necessity for the decomposition of brownstone, if the material is carefully selected. Every building that I have examined contains some stones that would last indefinitely, and if only those were selected from the quarry which have a silicious cement, there would be no necessity for waterproofing, and we should not have the rapid destruction in beautiful structures which is so common in countries where sandstones are used. The same kind of external waterproofing must also be done upon dolomite and limestone, but efforts in this direction have been less successful than upon sandstones. Many methods for the prevention of disintegration have been tried, not only with no success, but with absolute failure.

THE BUILDING EMPLOYERS' PROTECTIVE FEDERATION, NEW YORK.

## SOCIETIES

A MEETING of employers in the various branches of the building trades was called for 2 o'clock on Monday, the 14th, at Masonic Hall, Twenty-third Street and Sixth Avenue, at which the building trades were well represented; notwithstanding the unseasonable or inconvenient hour, a large and enthusiastic gathering took place. Mr. Charles Buek, Chairman, at previous meetings, could not be present on account of sickness. Mr. Thomas Cochrane was called to the Chair, and Mr. H. H. Hill acted as Secretary. The name of the organization (which is "The Building Employers' Protective Federation,") together with the Constitution and By-Laws forming the permanent organization were adopted, and with a membership of nearly five hundred. The election of officers for the ensuing year was then proceeded with, when the following gentlemen were elected.

George Hayes, President; Thomas Cochrane, First, and William Hoane, Second Vice Presidents; Hugh Lamb, Treasurer; and H. H. Hill, Secretary, and the following Trustees, viz., W. P. Chesley, Walter Reed, G. H. Kitchen, Enoch Ruetzler, David Morrison, John D. Ottiwell, Jos. A. McDonnell, H. Mandeville, Charles Buek, and A. I. Campbell.

In this Association one of the objects sought will be to fairly consider the rights of the employed, as well as the employer, and will tend to relieve the well-thinking mechanic of the tyranny to which he has been subjected, by being under the control of abusive societies. Cool deliberation will take the place of hot-headedness, which has hitherto prevailed, and the employer and employed will both be benefited.

After considerable business was transacted, the meeting adjourned to 8 o'clock, P. M., on Monday, the 21st, at Painter's Hall, 3 North Washington Square.

## COMMUNICATIONS

### OPENINGS FOR CONTRACTORS.

TORONTO, March 10, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

*Dear Sirs,* — Would you, or any of your numerous readers, kindly tell me through your columns what localities in the United States of America or Canada present the best advantages for progress to a sanitary and water-works engineering contractor, of large and capable English practice, and what steps would be most advisable to pursue in the establishment of such a business in the country. Any hints on these or other lines would be thoroughly appreciated by

"AXIS."

[If we may judge by the number and magnitude of engineering works now in progress, the Southwestern States offer a good field.— EDS. AMERICAN ARCHITECT.]

## NOTES AND CLIPPINGS

STRIKES AND LOCKOUTS. — In January, 1887, there have been reported 92 strikes and lockouts, involving over 73,300 employés, as compared with 19 strikes and 47,200 employés during January, 1886. Of the former, 88 strikes, involving 63,300 employés, were concluded by February 28, while 4 strikes, including 10,000 men, were still open. Of the 10,000 about 8,000 are New England boot and shoe factory hands, locked out as a protest against the Knights of Labor dictation as to shop management. The number of shoe operatives locked out or on strike February 1, 1887, was approximately 8,400; on March 1, 1887, 5,900. The number out in various small strikes is about 900, as about 400 February 1. In the great lockout in Worcester county there has been a gain, though not closely definable, by reason of new help hired and old hands returning on the employers' terms to some extent. It is estimated that the total out February 1 was 8,000, and March 1, 5,000. The first may be too large, the second too small. The total number of successful strikes of the January list, including compromises or successes, was 31 out of 88, ended by March 1, involving 18,173 employés. As the January strikes of 63,300 employés are ended, this shows that about 30 per cent of the employés have thus far been successful. The prospect, however, is for a smaller percentage of success after the termination of the boot-and-shoe lockout. The totals of failures are 57 strikes and 45,127 employés; about 70 per cent. In January, 1886, 9 strikes, with 23,000 strikers, were successful — nearly one-half — while ten strikes, with 23,300 strikers, were failures. In February, 1887, there were 74

strikes and 26,000 strikers, as compared with but 5 strikes and 10,700 strikers in February, 1886. By the close of the month 51 strikes, involving 20,000 strikers, had ended, and 23 strikes, with 6,000 strikers, remained unsettled. Of the 51 strikes, with 20,000 strikers, 12 strikes, with 5,350 strikers, had been successful, a little over 20 per cent; while 39 strikes, with 14,650 strikers, nearly eighty per cent, had been failures. In February, 1886, all the strikes were failures. Tabulating the totals for the past two months as compared with like figures for 1886, the following exhibit is obtained:

| | No. of strikes. | | No. of strikers. | |
|---|---|---|---|---|
| | 1887. | 1886. | 1887. | 1886. |
| Totals | 166 | 24 | 99,300 | 57,900 |
| Total ended March 1 | 139 | 24 | 83,300 | 57,900 |
| Total not ended | 27 | .. | 10,000 | .... |
| Total successful | 43 | 9 | 23,523 | 23,300 |
| Total failed | 96 | 10 | 59,777 | 34,600 |

A feature of the strikes thus far during 1887 has been found in the increase of "sympathetic" strikes—the stopping from work of employés of others than those parties to the dispute in order to force concessions from the parties really in interest by disorganizing productive and distributing agencies. As may be seen from the list of strikes given herewith, no fewer than 41,000 employés struck in sympathy with the 4,000 New Jersey coal-handlers and Old Dominion Steamship Company 'longshoremen, although in nowise personally interested in those disputes. It is also worthy of note that nearly 35,000 industrial employés have been thrown out of work within the two months, through inability to secure coal or supplies of raw material on account of strikes of others.—*Bradstreet.*

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The Management and Care of Wire Hoisting-Cables.—The *Compagnie des Forges de Châtillon* has been publishing a valuable and interesting set of rules and tables for the using of wires and metallic cables. Regarding the use and care of hoisting-cables, the company says: If the conditions do not permit the employment of hoisting-drums of 16 to 20 feet diameter, the cables should be of steel of great resistence, and have a safety-factor of 10; with cables of charcoal-iron, or soft steel, a factor of 6 can be used, especially if workmen are not to be lowered by it. Every two or three months the drum-fastenings should be renewed, and cables should be cut long enough to change this loading-point considerably. The tensile strength of the wires in the end should be tested each time the fastenings are shifted, and careful attention paid to broken wires at these points. This being the most abused portion of the cable, if the sum of the resistence of the sound wires exceeds one-fifth of the breaking-strain, the cable is still fairly safe; the broken wires in any one metre of cable-length are rejected in such an estimate of strength. Every eight days, and whenever the cable is cleaned the broken wires and frequency of breaks should be noted. When the number of broken wires in a running metre of cable reach one-tenth of the total wires, workmen should not trust themselves to it, but the cable may be used for hoisting material. Every eight days the cable ought to be carefully cleaned, then greased. For the latter purpose the coating should have, in summer, the consistency of butter, and be made of vegetable tar and tallow in equal parts. When this mixture is too stiff a little oil will soften it. Other lubricants can be used, such as heavy oils with tallow; tar and oil and heavy oils with oil of rape-seed (colza). The first-named mixture is the best, however. If the cable is much exposed to water, this greasing is required more frequently. There should be not more than two-tenths-inch play between the cable in its thickest part and the confining rims of the sheave or drum. In the form of general but important recommendations these rules warn the user to avoid the lashing or violent lateral movement of cables; quick jerks in starting to hoist, do not let the guides bind; avoid friction of the cable on any object other than the drum; give the drum 20 feet diameter if possible; examine the cable carefully after any accidental shock or abnormal "side-lash," and look well to the proper condition of the axles of drums and sheaves and their bearings.

To calculate the section of hoisting-cables to adapt them to a given load, and allowing for a given weight, the following rule is given by the *Compagnie des Forges de Châtillon:* Let $P$ be the weight to be raised; $L$ the length of the cable; $R$ the resistance to rupture in "kilogrammes per square millimetre," and $\frac{1}{m}$ the coefficient of safety adopted, which may be taken at one-sixth, but is sometimes taken at one-tenth. Then if we adopt a cable of useful section $S$, and useful weight per metre $p$, we have $p = S\,0.0085$. But as the cable should also carry its own weight, we have $\frac{RS}{m} = P + Lp$; whence $\frac{RS}{m} = P + L\,S\,0.0085$; whence $p = 0.0085\,S = 0.0085\,\frac{Pm}{R - L\,m\,0.0085}$.—*Engineering News.*

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Prototypes of M. Eiffel's Tower.—The Eiffel Tower might be cited in common with the majority of novelties as a proof that there is nothing new under the sun. It is well known that Trevethick, the Cornish engineer, did propose to erect a structure of the kind as the best memorial of the Reform Act of 1830. But it is also true that in 1845 a M. Cabillet prepared designs for a tower in Paris, which he called "La Tour de 1,000 pieds." It was to be conical in form, to be accessible to the top by means of a lift, and to have glazed galleries at different stages in which the spectators could contemplate the world at their ease. He calculated that four or five hundred people could ascend every hour, the time occupied being from five to twelve minutes. M. Cabillet, like M. Eiffel, did not propose that his tower was to be monopolized by sightseers. He also spoke about the opportunities that would be afforded for meteorological observations, and the advantage of being able to communicate with distant observatories. In those days the Parisians considered that nobody but a provincial would run the risk of vertigo by mounting to the top of the Colonne Vendôme or the Arc de Triomphe, and in consequence M. Cabillet's scheme was relegated to oblivion. It is dragged forth as a curiosity for a moment, and when it returns a good many will wish that its rival could also bear it company. —*The Architect.*

Stone Stairs.—It is not very uncommon to see solid stone stairs, with open well-hole and exposed soffit, put up with each step merely lapped over the other and pinned into the wall at one end. Architects well know that this is seldom enough for such stairs, but that, to be safe, each step must be notched upon the one below it, and that they often fail when otherwise executed. It is all-important with stairs of this kind that the bottom step stand on a thoroughly firm foundation, and that the lower front edge and the upper back edge of each step be well notched, the one to the other; the best form of notch, when the steps are triangular, being that with which you are all familiar, but for rectangles a square notch is preferable. Stairs are very strong when thus properly notched, but many faulty stairs exist even in good buildings from insufficient attention to the point. I suppose that what I state should be vouched for by an instance: therefore, let me name the railway station at Sydenham, where the stone steps were not notched, and where they got out of place, but, being observed in time, a queer remedy was applied by putting timber-beams under them, and wood strings housed on with wood rail and balusters, instead of the former of iron, and to the lower portion a wall was built under the ends. The stairs of the Shire Hall, Chelmsford, fell in 1856, breaking off, and leaving the ends in the wall. The accident was attributed to the landing falling first, yet this could scarcely have occurred if proper construction had been attended to. It is quite as necessary for the landing as for the steps to be notched on, and the landings should be joggled together, and in many cases it is wise to put an iron beam, but never a wooden one, on account of its shrinkage, which, however slight, would slack the bearing.—*E. Nash.*

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## TRADE SURVEYS

At the present rate of expansion in manufacturing, railroad-building, house-building and machinery-making, it seems to be only a question of time, judging at least by our past history, when over-production will call a halt. The country is not producing more than it needs, but may be producing and expanding faster than a symmetrical development permits or requires. Consumptive capacity ought to be doubled and expand year by year beyond. The people are not too sumptuously fed or clothed or housed, and until they are there can be no legitimate over-production. That which concerns this practical age is how to regulate production to the slowly-expanding consumptive capacity. A stop or a checking-up must be brought about in a short time. Our economic and social affairs do not admit of a go-as-you-please expansion. It seems to be beyond the reach of the intelligence of the age to provide markets for our energies, or rather, the results of energy. Such an equilibrium will some day be found, but it is too remote to be studiously regarded now. The world is crowding its energies; shops, mills, mines, factories, have no idle capacity. The work of colonization is going forward, and will be greatly increased. The unauthenticated rumor that a syndicate of American and British capitalists contemplate the investment of twenty million dollars in South American railroad enterprise only points to what must and will take place. The age of enforced compactness of industrial and agricultural communities is going. A disintegration is going on, made possible by cheap and easy travel in and to all parts of the world. Evils hoary with age will rust rapidly away under this coming scattering of the world's population. The home industrial conditions are sound. Less business was transacted last week because of the uncertainty as to what freight-rates will be after April 5. No weakening of prices is observable, and buyers in all channels of trade will continue to cover future requirements as they have been doing. The railroad-barometer shows improving demand and higher mid-summer prices. Labor has been quietly advanced in many branches. Material has increased in cost. Certain kinds of lumber are higher by one dollar per thousand, and demand is only awaiting the actual opening of the spring trade. The Western supplies are fully up to every probable requirement, and the yellow-pine markets are full. Hardwoods are scarce. Hemlock is held under something like a speculative control. White-pine is strong in price and in primary markets. Heavy shipments are being made to both Eastern and Western markets at cut rates, in order to discount the new rates under the inter-State commerce law that will go into effect about April 1. In view of the immense stocks of lumber in manufacturers' hands, any attempt on their part to maintain high prices will check the spring trade and cause a collapse. Lumber is being rushed out of far Northwestern markets as rapidly as shipping faculties permit. The moderate improvement in building-operations, so far this month, in the West and Northwest, is easily explainable. Questions of wages and cost of material have arisen in some quarters. It has been a question whether the rank and file of labor organizations would revolt against the conservative management and advice of the leaders who have been warned against an extreme course. The building-operations in the West will be characterized this year by the large number of small houses that will be erected. A great deal of lumber has been contracted for to prosecute building enterprises along the lines of roads leading out of the principal Western cities. The lumber demand in Eastern cities and towns will, of course, exceed last year, and Western manufacturers are establishing Eastern agencies in order to profit by direct dealing. Higher freight-rates, higher sawing and dearer labor, coupled with a more active demand, all promise to make the lumber problem quite an interesting one. The coal-trade is unsettled for like causes. Wages have been advanced among bituminous miners. The three railroad corporations which handle the bulk of the coal consumed in the East, held several conferences this week and fixed freight-rates and tolls under the new law. Anthracite has advanced one dollar as against last year, and soft coal fifty cents. Taking a passing glance at the iron industry we find production one hundred and thirty-five thousand tons of crude iron per week. Bar iron has advanced two dollars per ton. Rails, two dollars per ton. Steel rails are weaker. Old rails irregular. Large iron and steel imports are due shortly. The American iron trade is calling for ore from Cuba, Spain and Africa, crude steel from Germany, and steel rails and tin plate from Wales. The deficit this year to be supplied from foreign sources will be fully thirty per cent, possibly fifty per cent over last year. In the lighter industries orders continue to crowd capacity. In real-estate operations no weakness is manifest, especially in city real estate. Large transactions are reported from week to week in suburban properties for building purposes. In New York, Pennsylvania, and Ohio especially is real estate active, largely estimated by industrial activity. Fortunately, breadstuffs and provisions, as well as rents, will rule lower, and thus add to the general contentment and confidence.